

PRACTICAL NOTES

ON

ETCHING

BY

R. S. CHATTOCK

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# ETCHING

BY

R. S. CHATTOCK

FELLOW OF THE SOCIETY OF PAINTER-ETCHERS

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# PRACTICAL NOTES ON ETCHING.

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## INTRODUCTION.

THE following chapters upon the practice of Etching appeared originally for the most part in the pages of "The Etcher," and they were written under the impression that the experience gained during many years of practice might afford useful hints for the guidance of novices in the art. It is true that there has been no lack of valuable treatises upon etching. Not to speak of earlier and now, perhaps, somewhat antiquated works, the recent writings of Haden, Hamerton, and Lalanne—all of them practical etchers—might seem to have embraced everything that could be usefully said upon the subject. Yet no less true is it that the difficulties of a manipulatory art often vary with every operator who practises it, and that although a writer may seem to himself to have forestalled every possible occasion of error, there may yet remain many upon which he has failed to touch, owing to the fact of their never having presented themselves as difficulties in his own practice. Be this as it may, it appeared to the writer that, in spite of all that has appeared upon the subject of etching, there were still some branches of it upon which it might be useful to enlarge, and while it has been his endeavour to give a sufficiently full and clear account of all the principal methods of proceeding now in vogue, together with such modifications of them as he has been led to introduce in his own practice, he has treated some parts of the subject—such, for instance, as that of needle-work—with a

degree of fulness not hitherto attempted. Judging by his own experience of the errors into which beginners are liable to fall, some hints upon the management of the needle appeared to him by no means superfluous, although they may simply embody conclusions to which, in their absence, the etcher's own practice would sooner or later guide him.

The subject of mordants was also one which appeared to deserve some amplification. The etcher having found a mordant to his liking, and to the use of which he has become accustomed, forbears, as a rule, to trouble himself about any other. Hence it is rare to find any one who has much practical acquaintance with the characteristics, various as they are, of more than one. Some comparison, however, of those generally in use seemed desirable, and this, partly from his own experience, partly through the kindness of friends whose practice has differed from his own, the writer has been enabled to supply. He trusts, in short, that in the following pages many hints respecting the minutiae of the etching process may be found not previously touched upon. There are probably few workers upon the copper who have not met with difficulties in practice, to overcome which they have been driven to devise their own expedients. There must be many whose experience, if recorded, would not fail to be both interesting and instructive, and to afford valuable hints towards surmounting the obstacles which beset the young etcher's path.

### I.—CHOOSING THE PLATE.

Among the essential preliminaries to successful etching, the first to be considered is the proper selection of the copper plate. Unfortunately, this is by no means so easy a matter as may appear; for there may be fatal defects in a plate which the closest scrutiny fails to detect, and which only reveal themselves after the copper is worked upon.

Sometimes, when a plate is very imperfect, a certain

mottled appearance, due to the presence of a multitude of minute ramifying lines, may be observed. The copper is said to be spongy, and in this case should be unhesitatingly condemned. Were it to be etched upon, and a proof to be taken, it would be found that each of the above-mentioned lines would make its mark upon the paper, to the entire destruction of anything like purity in the lights of the picture, and that with every successive impression the defect would become more manifest. Not unfrequently, however, a plate which appears to the eye perfectly sound is in reality deceptive, and soft, either altogether, or in patches. In the former case the mottled appearance above referred to, though not at first observable, will, after a very few impressions, begin to show itself, with all its attendant disadvantages; and in the latter there will be the additional annoyance of uneven biting, as the rate at which the plate is acted upon by the acid depends upon the density of the metal.

The question naturally suggests itself whether there are no means by which the etcher can test the copper plate before purchasing.

With this object in view, some etchers try the ring of the plate by balancing it on the outspread tips of the fingers of one hand, while striking it with the other. It is said that the sound will vary according to the density of the metal, a soft plate yielding a more muffled tone than a hard one. Probably to a practised ear this may be a satisfactory test, but it can hardly be relied upon in the hands of a person unaccustomed to its use.

Perhaps the best available test—though it is by no means a crucial one—is afforded by the appearance of the back of the plate. In former days, before the introduction of modern machinery, all coppers were consolidated by hammering—a process which left its mark in the battered appearance of both sides of the plate. On the back of the plate this remained, and afforded evidence of its history; on the front it was, of course, obliterated in the after-processes of planing

and polishing. In the present day many coppers, instead of being hammered, are simply passed between heavy rollers, as is shown by the smooth, unbattered state of the back. The pressure thus brought to bear upon them is, indeed, enormous, but where the plate is of unequal density, it fails to consolidate the weak places, and plates which have been so treated cannot be relied upon with the same confidence as those which have been hammered.

On the whole, the best advice to be offered to the young etcher, in reference to the selection of his plates, is, that he should be careful to deal with a firm of high respectability, and that he should insist on having the plates thoroughly hammered—noting well the state of the back of the copper. He will have to pay a rather higher price for them, but the increased security and durability are really worth the additional outlay. M. Lalanne recommends that the plate should be purchased thicker, but of somewhat smaller size than required, and hammered out until the proper size is attained—a course which will insure the metal being thoroughly consolidated. But this does not apply to “spongy” copper, the defect of which is irremediable by hammering or any other treatment.

## II.—CLEANING THE PLATE.

Before proceeding to apply the etching ground to the plate, it is necessary to remove from the surface of the latter every trace of grease, which, if allowed to remain, would prevent the etching ground adhering firmly to the plate, and cause it to break away in patches. There is nothing better for its removal than rectified spirit of turpentine applied with a soft rag. Whiting and other powdery substances sometimes recommended seem undesirable on the score of dust.

Some etchers are careful also to remove from the copper all marks of tarnish. The necessity for this, if it ever exists, seems to do so only where the etcher adopts the principle of

not allowing the needle-point to penetrate the surface of the copper; and it arises from the fact that copper, when tarnished, is less readily attacked by the mordant than it is when bright, and in order to obviate the unequal biting which the presence of tarnish would thus involve. The removal is easily effected by plunging the plate into a bath of pure hydrochloric acid, or by the application of water slightly acidulated with nitric acid.

Both grease and tarnish may also be conveniently removed by rubbing the plate with willow charcoal. The charcoal, of which a tolerably broad piece should be chosen, should be cut at an acute angle with the grain, and the surface thus obtained should be placed flat upon the copper, under water. It should then be driven, gently but steadily, from end to end of the plate in single, even strokes, after the manner of a carpenter's plane; the result of which will be, that the old surface of the copper, with all its impurities, is removed, and a new one substituted, uniformly marked by a multitude of exceedingly minute striations due to the grain of the charcoal. The plate, if printed from in this state, should yield an even tint of delicate grey. In those passages in which the artist may desire the pure white paper to be seen, the striations are afterwards easily removed, and the original polish of the copper restored by the use of the burnisher; or the whole surface of the copper may be repolished with crocus powder and sweet oil applied with a piece of soft flannel. Another advantage resulting from the use of the charcoal is, that the striated surface of the copper affords better holding for the etching-ground than a polished surface would give.

### III.—THE ETCHING GROUND.

The plate, having been cleaned as previously described, should now be coated with the etching ground, and it is in some respects desirable that this should be done before the copper has had time to become tarnished by contact with

the air—an effect which the impure and smoky atmosphere of the town soon produces.

Etching ground which may generally be relied upon, but the constituents of which are known only to the maker, may be purchased; and the following observations are intended for those who, acting upon the maxim that “if you want a thing well done, you should do it yourself,” prefer to prepare their own.

Among the qualities to be sought, the following seem to be the most important. The ground should be impervious to the acid, in order to protect those parts of the plate which are not intended to be bitten. It should cling to the copper with sufficient tenacity to prevent the mordant finding its way between them, at the same time that it should be so easily removable by the etching-needle as to offer the least possible resistance to the free play of the artist's hand. If too hard, it will chip from the copper, and flake off as the needle passes through it—a ragged line being the result; if too soft, it will be liable to accidental injury which will lead to “foul biting.” A soft ground, moreover, sometimes shows a tendency to be torn from the plate by the needle. And in hot weather it will sometimes cling to the needle-point, which thus becomes clogged with the ground, and incapable of making any but a broad and clumsy line, a state of things which involves a frequent wiping of the needle.

The happy mean indicated by these varied requirements is realised by a judicious combination of certain hard and soft elements of which the ground is composed: the soft element generally adopted being pure white wax, and the hard elements such substances as asphaltum, resin, gum mastic, black pitch, Burgundy pitch, Japan varnish, &c. And it may be observed that the elements should be combined in different proportions, as the ground is required for use in hot or cold weather: a ground which would be too hard for use in cold weather giving satisfactory results when the temperature is high.

Another point which should be considered in connection with the mordant to be used, is the colour of the ground. If the hydrochloric mordant, which darkens the bitten surface of the copper, be adopted, it will be found convenient to work with a somewhat pale ground, in contrast with which the darkened lines of the etching will be clearly discernible. When the mordant used is such as leaves the bitten lines pale, which is the case with nitric acid, a dark ground may be preferable.

In the published formulæ for the preparation of etching ground it is usual to find several of the above-mentioned "hard" elements combined together, with a view of securing the double character of hardness and adhesiveness. It appeared to the writer that, if a single substance could be found affording both of these qualities, it would be preferable, on the score of simplicity, to use it in exclusion of any other. This desideratum he found to be supplied by asphaltum, and after many experiments he was led to adopt a simple mixture of asphaltum and wax. This he has used for many years, and has found it to be impervious to the acid, and quite free from objection in other respects. In a thin film it gives a light brown colour, sufficiently dark, without being smoked, to afford contrast to the bright lines where the copper is exposed by the needle, and thus to enable the artist to see the line as he draws it; and, on the other hand, pale enough to allow the lines when darkened by the hydrochloric mordant to be clearly seen.

The proportion which the wax should bear to the other ingredients of the ground varies much in the several formulæ put forward by writers upon etching. In Bosse's ground—one which can with safety be recommended—the proportions by weight are as follows:—Wax, ten parts; gum mastic, six parts; asphaltum, three parts. The materials are combined by melting in a glazed earthenware pipkin; the wax being first melted, and constantly stirred with a glass rod, while the asphaltum and gum mastic are gradually added; and the

whole, when thoroughly melted and mixed, may be either poured into warm water, and made up into balls for use, or converted into "etching paste" by the addition of oil of lavender.

When asphaltum forms the only "hard" element employed, it seems that the proportion of wax should be much less than that above indicated; and especially is this the case when the practice is adopted of dissolving the ground, and applying it to the plate in a liquid form. The writer has found that an excess of wax not only occasions difficulty in filtering, but sometimes altogether prevents the ground drying.

For liquid ground it will probably be found most convenient to keep the materials in separate solutions, and to mix them in the necessary proportions when required for use. To prepare the solution of asphaltum, the substance should be pulverized, and tied up firmly in one or two thicknesses of very close fine muslin, and so placed in chloroform in a wide-mouthed bottle. The soluble portions of the asphaltum will pass freely through the muslin, while the impurities will be left behind, and the solution may then be decanted into its proper stock bottle for use. The wax solution should be also prepared in a similar manner, the wax being previously scraped into thin shreds. The solutions should be sufficiently thin to flow easily, and they should be combined in proportions of one part by volume of the wax to five parts of the asphaltum. In hot weather the proportion of the wax may be much smaller, and in intense heat it may be sometimes found desirable to add a small quantity of gum mastic, which may also be kept in solution, prepared in the same manner as that of asphaltum. Especially is this the case when the nitric or nitrous acid mordant is used, the effervescence attending which has a tendency to disturb the ground at the edges of the lines, from which a still mordant is comparatively free.

## IV.—LAYING THE GROUND.

There are three methods in use for applying the etching ground to the copper, all of which it may be well to describe, as each is useful under special circumstances.

In the first, which until recently was that usually adopted, the plate is heated sufficiently to melt the ground without burning, or causing it to boil. For this purpose it may be held in a hand-vice over a gas-jet—its face being protected from the roughness of the vice by a cushion of soft paper. To insure the proper degree of heat is of the highest importance. If the ground becomes burnt it is no longer of use, and, should the heat of the copper be such as to cause it even to smoke, the ground should be at once wiped off and a fresh ground laid.

Should the etcher contemplate proving his plates himself, which he is strongly recommended to do, he will have to furnish himself, among other printing apparatus, with a heating plate, and this he will find of the greatest convenience for laying the ground, especially upon plates of large dimension. It consists of a large iron plate, of about half an inch in thickness, the space beneath which is enclosed with sheet iron, and heated with gas-jets, or a spirit-lamp. By this means the heat can be easily regulated, and an even temperature maintained for any length of time. And it may be observed that for printing purposes the iron plate should be considerably larger than the copper, and it should be heated by more than one jet, placed sufficiently far apart to admit of different portions of the iron being kept at different degrees of temperature. A convenient heating table of cast iron (Fig. 1) is manufactured by Messrs. Hughes and Kimber, of Fetter Lane.

Another plan for heating the copper plate is to have a flat rectangular box of copper filled with water, which is kept at the proper temperature by a gas-stove or spirit-lamp.

Over the whole surface of the copper plate thus heated, the etching ground, previously made up into a small ball, and wrapped in a piece of thin porous silk, is rubbed, and, being melted by contact with the copper, passes freely through the silk. It is then equalised and distributed over the plate in a thin, even layer by means of a silk or leather dabber.

The dabber should be flat with rounded edges, smooth, soft, and elastic; and may be made as follows. A circular disc of thick cardboard should be prepared, having a diameter of about three inches, three or four thicknesses of the softest cotton-wool of the same size, some horse-hair, and a piece of strong, smooth silk about eight inches square. The silk being spread out, the cotton-wool is first laid upon it, then

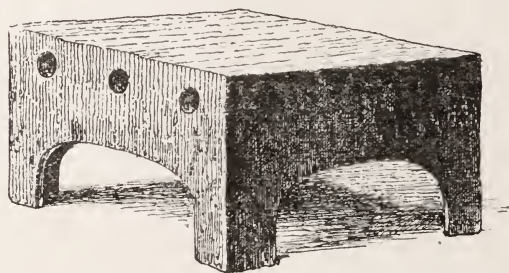


Fig. 1.

the horse-hair in an even layer, and last of all the cardboard disc. The silk is then run round with a needle and strong thread, at a distance of about an inch outside the edge of the cardboard, and drawn up so as to enclose the whole, and, the edges being brought together and fastened off to form the handle, the dabber is complete.

A piece of kid leather is sometimes substituted for the silk. Both materials present a certain roughness of surface, due, in the one case, to the texture of the silk, and in the other, to the minute papillæ from which the animal's hairs have sprung; and the utmost care must be taken that in spreading the ground the copper is thoroughly covered, and the occurrence of "pinholes" avoided.

Another mode of applying the ground is by means of a roller (Fig. 2); an implement introduced in Paris, originally for the purpose of laying the ground for rebiting, but which is equally serviceable in laying it in the first instance. It consists of a wooden roller about two inches in diameter and five inches in length, covered with leather, and resembles in miniature an ordinary garden roller.\* The ground is applied in the form of a very soft paste—almost liquid—made by adding a sufficient quantity of oil of lavender to the other ingredients when

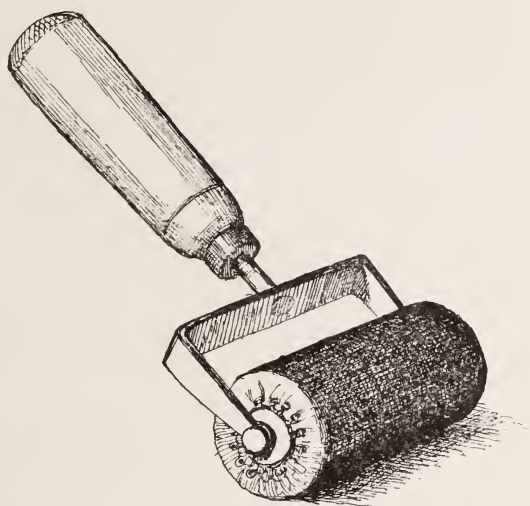


Fig. 2.

in their melted state; and it is spread, in the first instance, upon a clean copper plate, and the roller passed and repassed over it until every part of the latter's surface is evenly charged with the ground. The roller is then transferred to the plate which it is proposed to coat, and moved backwards and forwards upon it until the surface of the copper is entirely covered with an even film. The volatile oil of lavender is then driven off by the application of a moderate degree of

\* These rollers are now made of gelatine, which affords a surface of more perfect uniformity than the leather.

heat to the back of the plate, and the ground left in a firm state.

In laying the ground it is very essential to avoid, as far as possible, the admixture of dust, the particles of which would cause weak places through which the acid might find its way. Unfortunately, in either of the above processes, minute particles may be present without their presence being disclosed; and this fact, coupled with the great difficulty of finding an atmosphere free from dust, inclines the writer to prefer the process of applying the ground in the form of solution. By this method "pinholes" are altogether avoided. Dust, although it may be almost obviated by the apparatus presently to be described, cannot be absolutely eliminated, but it either floats off on the surface of the solution, as it is poured back from the plate into the bottle, or, failing this, it effectually declares its presence by a certain amount of disturbance which it causes in the uniformity of the film; and it can then, if necessary, be stopped out before the plate is bitten.

The writer has found chloroform to be the best solvent for the ground, but the solution should be passed two or three times through filtering paper before it is used. It is desirable to use plenty of the solvent, and to have the ground in a very fluid state; and care should be taken to have the chloroform perfectly free from globules of water.

In applying the ground, the plate, if small, may be held in the hand, while the solution is poured over it from the bottle—as collodion is poured over the glass by a photographer. It should then be tilted in order to carry the solution into every corner, and the excess of solution poured back into the bottle from the last corner visited.

In the case of large plates the following difficulties present themselves. Owing to the extent of the surface, the chloroform, being exceedingly volatile, evaporates, and the solution dries over some portions of the plate before others have been covered—the result of which is a film of uneven thickness. The dust also, of which there is always much floating in the

atmosphere, has time to settle upon the plate, and becomes a source of considerable annoyance. To obviate both of these

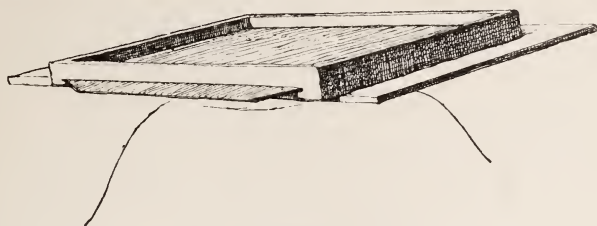


Fig. 3.

difficulties the following plan may be found useful. The apparatus (Fig. 3) required consists of a drawing-board and a light wooden frame, rather smaller than the board, but larger than the plate intended to be operated upon, and having a groove round its inside, after the manner of a school-boy's slate, to receive a sheet of glass. The groove should be so placed that, when the frame is laid upon the drawing-board, the glass should be distant from its surface about a quarter of an inch; and along one side of the frame the wood should be cut away from the under-side of the glass, and the latter prolonged to form a handle for raising the frame. A glass tube (Fig. 4) is also required about a foot long, closed at one end, but having the other end spread open, and fitted to receive a cork. The tube is for the purpose of holding the chloroform solution, and it should be bent to a right angle at a distance of about an inch and a half from its open end. The glazed frame being laid upon the drawing-board with its "handle" side projecting about a couple of inches



Fig. 4.

beyond the edge of the board, the plate is introduced between them, and so placed that one of its corners also projects beyond the board to a distance of about an inch. The apparatus should then be placed upon some circular support—such as the bottom of a large basin turned upside down—and, the glazed frame being slightly raised, the tube filled with the chloroform solution is introduced, and a sufficient quantity of the solution poured on the centre of the plate—an operation which is much facilitated by the bend in the tube above referred to. The tube is now withdrawn, and the frame replaced, and the drawing-board, with the plate and frame upon it, tilted in every direction upon its circular base, so that the solution may be carried over every portion of the plate. It will be found that, owing to the extreme thinness of the stratum of air in contact with the solution, evaporation takes place so slowly that there is ample time for the plate to be successfully covered long before the solution dries.

In case the latter should manifest any hesitation in flowing over the plate, it is well to have a long piece of wire at hand with which the operation can be forwarded. When the plate is coated, the excess of the solution can be returned to the tube from the corner which was left projecting over the edge of the board.

After the plate has been coated with the solution, twenty-four hours should be allowed to elapse before it is submitted to the action of the mordant. The chloroform, it is true, soon evaporates, and the ground becomes in a certain sense dry, but it remains for some time tender, and would in that state afford a very imperfect protection to the plate.

#### V.—COLOURING THE GROUND.

Among the difficulties which beset the etcher's path, there is one which appears to have exercised his mind not a little—

that of not being able to see clearly his work upon the copper while it is being executed, and several expedients have been devised for the purpose of overcoming this. Foremost among them is the plan of smoking the ground. All that is essential is a sufficient contrast between the etched line and the ground upon which it is traced, and it is difficult to imagine any contrast more complete than is afforded between the bright copper of the lines exposed by the needle, and the dead blackened surface of a smoked ground. It is true that the effect of the picture, as regards light and shadow, is the converse of that which is presented by the proof when the plate comes to be printed,—the black lines of the proof being represented by burnished copper, and the white paper by the blackened ground. But this is of little moment. All that the artist really requires is the power of seeing his work as he does it, and this the smoke upon the plate enables him perfectly to do.

The best way of smoking a plate is to pass it, face downwards, across the broad and steady flame which issues from a “bat’s-wing” gas-burner. Where the convenience of gas does not exist, the old plan of twisting together several pieces of thin taper into a sort of flambeau may be adopted. In either case, great care must be taken that the ground does not become burnt.

It is not only while working with the needle, however, that the artist requires to see his lines. This is equally indispensable during the process of biting, and it is obvious that, if the ground be darkened, it will be necessary to use a mordant which will keep the lines bright, or at least pale in colour. This the nitric acid mordant does. The hydrochloric mordant, on the other hand, darkens the lines to such a degree that they are quite indistinguishable from the smoked ground, and, when that is used, the ground must be kept pale. On this principle, and in order to obtain the utmost degree of contrast, and at the same time to insure that the lines of the etching shall appear dark upon a white surface, Mr. Hamerton

has introduced a process of silvering the copper plate, which he afterwards covers with a perfectly colourless ground, so that the darkened lines of the etching are seen as clearly as on white paper. At first sight this may seem an unnecessary refinement, but it is really not so. So difficult is it for an unpractised eye to judge of the light and shadow of an etching, when the plate is covered by a dark ground, that anything which lessens the difficulty may be welcomed as a distinct advantage. The process is available only where the etcher adopts the practice of working upon the copper while it is in the mordant, as the lines are invisible until attacked by the acid. Even in this case a few seconds elapse before the darkening of the lines takes place, and hence it seems better on the whole, when using the hydrochloric mordant, to adopt, as above suggested, a ground which, while dark enough to allow the bright lines to be seen at the moment of drawing them, is yet pale enough to show them also when they have been darkened by the acid.

As the last-mentioned process is available when the plate is worked upon in the bath, so, on the other hand, in cases where the needle-work is completed before the biting begins, some etchers adopt a process of coating the grounded plate with white body-colour. In "The Etcher" for March, 1880, Mr. Huson describes such a process as practised by himself. The plate being covered with a ground of wax and gum mastic dissolved in chloroform, is dried over a lamp, and, when cool, a wash of ordinary "bottle" Chinese white is applied with a soft brush, and as the needle penetrates the ground the work appears distinctly as a "positive" in dark lines upon a pale ground.

## VI.—THE NEEDLE.

Before entering upon the subject of working with the needle, it will be well to devote a short space to the consideration of that implement.

Etching-needles are supplied in two forms; either single, and fixed in wooden handles, or made entirely of iron, thick in the middle and tapering to a point at each end. The latter form is to be preferred, as it affords the means of having points of different degrees of fineness in the same instrument.

The proper sharpening of the needle is a matter of great importance to the etcher, and the process is one of not a little nicety. The needle should give a line of the same thickness in whatever direction it may be used, and, to insure this, its section should be perfectly round. Probably the best mode of sharpening it is to fasten it in a lathe and turn it, using the sharpening-stone as a tool in doing so. As a lathe, however, is not at the command of every etcher, the following plan may be described, and will be found quite effectual. The stem of the needle should be held between the palms of the hands, and rolled or "trundled" backwards and forwards, its point being laid upon a piece of Arkansas or other sharpening stone. The pressure on the stone should be light, and the operation performed very evenly—the needle-point being frequently examined with a lens while it is proceeding,—and the slope of the needle to the point should be gradual rather than abrupt.

The point, having arrived at the highest attainable degree of sharpness, should now undergo a certain process of burnishing. The chief glory of the etched line is its perfect spontaneity, and, to insure this, it is essential that the needle should pass over the copper with equal facility in every direction. But it is obvious that if a needle, simply sharpened as above described, were driven point first over the plate, the point would at once dig into the copper, to the entire destruction of anything like freedom in the work. To obviate this, the point should be placed upon a flat surface of glazed porcelain, and the stem of the needle again rolled between the hands as before, considerable pressure being now used. By this means the point becomes rounded off, so

that, while it still preserves much of its sharpness, it is found to glide freely over the copper in every direction. A needle-point can hardly be considered to be in a perfect state, unless (whichever side of the instrument be used) the lines produced are of uniform thickness, and the needle can be *driven* point first over the plate without obstruction. Excessive sharpness in the needle may also be removed by a few strokes upon a wooden surface, or a piece of buff leather. The etcher having been at the pains to secure a perfect point to his needle, will do well to guard it jealously, and to keep it, when not in use, protected with a piece of cork.

It remains to consider the needle-point to be used when the plate is worked upon in the mordant, which attacks a steel needle as actively as it does the copper plate. It has been suggested that, even where this occurs, the loss of a needle is not a very serious matter, and if the question were simply pecuniary, it would not, perhaps, be worth consideration. Unfortunately, however, the acid is apt to corrode the needle in a very uneven manner, and the consequence is that the operator finds himself, after a while, working with what may be more fittingly styled a "ragged stump" than a needle-point—a condition not conducive to a satisfactory result.

A pencil of glass is sometimes recommended as a substitute for the metal needle, but ordinary glass is of so brittle a nature that, when brought to a sharp point, it is very apt to break and become unmanageable. Whether a needle formed of the toughened glass recently introduced would behave any better the writer is not prepared to say.

On the whole, he has no better suggestion to offer upon this subject than that contained in the memorable paper "About Etching"—which every etcher ought to read—contributed some years ago to the "Fine Arts Quarterly" by Mr. Haden, viz.: "A point formed of a faulty diamond, or a colourless sapphire, or a piece of chalcedony, or a rock crystal, or any primitive stone having a natural cleavage and

a cutting edge, firmly fixed in a pencil of ebony by a gold or platinum band."

## VII.—NEEDLE-WORK.

We abandon now for a while the prosaic operations of the laboratory, to devote ourselves to those which are more directly and essentially artistic. The etcher, armed with his perfectly sharpened needle—"slave of his thoughts, obedient to his will"—sees nothing between him and the grounded copper upon which his fleeting imaginations are to take shape; and far be it from the present writer to seek by any arbitrary and vexatious restrictions to hinder him in the free exercise of what should be the most autographic and spontaneous of human arts. None the less true, however, is it that there are certain principles of working which the beginner will do well to bear in mind—certain causes of failure against which he should be placed upon his guard.

One of the commonest errors into which the young etcher is liable to fall is that of overworking the lights of his picture. Striving to emulate, with the needle, the line-engraver's mode of execution, he will be disappointed to find that, while he entirely fails to secure the delicacy and uniformity which he admires, he has not only sacrificed the purity of his light, but has also missed, what is a special characteristic of good etching, the expressive significance of the line. The two arts are, in fact, distinct, and although the truths sought to be expressed may sometimes be identical, their treatment will be very different.

The etcher, in short, relies for expression (especially in the lights of his picture) upon his *line*, and, in order that this may have its full effect and recognition, he will do well to bear in mind the maxim that while "speech is of silver, silence is of gold," and to leave plenty of white paper around his lines for the double purpose of allowing these to be the more clearly seen, and of affording effective contrast in the light and shadow of his work.

There is a point of considerable importance regarding the character of the etched line in relation to the depth to which it is proposed that it should be afterwards bitten.

The action of the mordant is twofold. In the first place it takes effect in a vertical direction, and simply deepens the line. Very soon, however, a lateral action also takes place, the result of which is that, while the deepening still goes on, the line is also widened, and, in proportion as this action is continued, its character becomes changed. The delicate curvatures and *nuances* visible during the first stages of the biting process are overborne and obliterated as it proceeds, and closely adjacent lines which are at first distinct become, by the eating away of the ridge which separates them, fused together. Hence it follows, on the one hand, that passages the lines of which are characterized by subtlety of curvature or close intricacy of arrangement should be tenderly bitten, and on the other, that lines which are intended to be deeply bitten should be simple in character, and open in arrangement.

In connection with this the student may usefully compare the complexity of the refined and tenderly bitten lines which Rembrandt uses to express the hair, for instance, in his early portraits, with the lines etched by Turner in the plates of the "*Liber Studiorum*." The latter were required to give character and transparency to the mezzotint, and it was therefore essential that they should be deeply bitten. Vigorous as they are, and full of character, displaying the perfect knowledge of the master, they are scarcely less remarkable on account of their studied simplicity.

Of this use of the heavily bitten "organic" line in affording expression and transparency to shadow, more will be said hereafter, but before leaving the subject of the action of the mordant in widening the line, it should be observed that, while allowance must be made for it in the lights of the picture, this is no less the case in the deepest shadows.

If we compare a well-printed impression from an etched

plate with one from a woodcut—especially if the comparison is made (as, according to connoisseurs, etchings should always be seen) under a side light—a remarkable difference will be observed in the depth and transparency of the shadows, those in the woodcut appearing flat and opaque by the side of the etching. This result is due to the fact that the line of the etched plate being hollow leaves upon the paper a ridge of ink, which every printer who understands the printing of etchings is careful, in drying the impressions, to preserve intact; and this, varying according to the depth of the lines, imparts to the proof a variety of texture unattainable in the impression from the woodcut, in which the lines, being printed from the surface, are all of equal flatness.

It is obvious that, in order to secure this variety, and its resultant transparency, the lines must be graduated in depth of biting—the deepest being reserved for passages of the most intense shadow. But depth of shadow will also be largely in proportion to the juxtaposition of the lines—open work, where much of the paper is shown between them, being *cæteris paribus* paler than where the lines are more closely placed,—and the young etcher, acting upon this principle, naturally makes his work closer as the shadow deepens, and he is apt, in the darkest passages, to place his lines so near together, that, long before they have acquired the requisite depth of biting, the mordant, acting laterally, has swept away all the intervening copper, and reduced the whole passage to a uniformly flat depression which either fails to retain the ink when the plate is wiped for printing, or, at best, prints as a mere blot. It should, therefore, be borne in mind that, in passages which are intended to be heavily bitten, it is necessary to keep the work open, and so to allow for the widening action of the mordant.

The principle of adjusting the closeness of the work to the depth of the biting holds good, indeed, throughout, and it is a well-understood maxim that, where it becomes necessary to associate close work with open, the lines of the latter

should, in order to "hold their own," be much more deeply bitten than the former; and the etcher has to be constantly on his guard against the tendency of all close work, if strongly bitten, to run into blots.

Another aspect of the same question presents itself in reference to the direction in which lines in shading should cross each other. It often happens that, when this takes place at an acute angle, the widening action of the mordant at the point of junction gives rise to the effect of a blot, and causes unevenness in the shadow. In some passages this very unevenness may be made conducive to the expression of character, in others it may be fatal to it, and where this would be the case, care should be taken that the lines shall cross each other as nearly at a right angle as may be. The advice here given may seem to be at variance with the practice of Rembrandt and others of the great etchers of old, in whose works the lines in the deep shadows cross each other in every direction, and are laid so close that the unassisted eye sees no space between them, and yet there is neither blot nor unevenness. It should, however, be observed that the lines in these examples were not all bitten together—the practice having been to lay a fresh ground, and so protect the lines originally laid before the crossing lines were added, the simultaneous widening of the lines being thus avoided.

The proper adjustment of the closeness of the work to the depth of biting constitutes one of the chief difficulties in the etcher's path. The problem, by no means simple in itself, becomes still more complicated by the necessity of taking into consideration the effect which a passage will receive from association with others.

A distinguished living etcher was once asked how he was in the habit of lightening an over-bitten passage, and his reply was, "By putting one more heavily bitten by the side of it." The principle of contrast here implied, and which in fact underlies all graphic art, is nowhere more conspicuous

in its results than in etching, in which a passage receives much of its effect from the relation which it bears to its surroundings, and appears pale or dark accordingly.

It is, however, not only in reference to the weight of shadow that a knowledge of the relation between the needle-work and the biting is essential. In the half-lights of an etching the same weight of shadow may often be obtained by using either lightly bitten close work, or more heavily bitten open work; and were that the only question, it might be a matter of indifference which of the two methods should be adopted. But, considered in reference to the question of texture, the two methods afford results widely different, and the etcher who would avail himself of all the capabilities of his art in expressing the varied phenomena of the world around him will find the means thus indicated of imparting a corresponding variety to his work to be of the highest value.

Some of the difficulties attendant upon the process of biting have already been indicated, and there are others of which more will be said hereafter—taken together they present a formidable array, sufficient to damp the most persevering ardour, were there no means of correcting mistakes.

Happily these are by no means wanting. If the work be too heavily bitten, there are several ways of lightening it—if too light or open, the lines can be deepened by rebiting, or supplemented by the addition of fresh lines, either bitten or worked with the dry point. Much also may be done in the same direction by management of the plate in printing, both in the way of *retroussage* and also of leaving a tint of ink, more or less heavy, upon the surface of the copper. But upon these latter expedients, perfectly justifiable as they are in themselves, and when kept within due bounds, it is not wise to rely too much. In the first place, it is only in the hands of a very first-class printer that they can be resorted to with anything like precision or uniformity of result. And even where the services of such a skilled workman are available, if too much is left to be supplied by ink from the

surface of the copper, the shadows of the work are apt to become opaque and muddy in character. The printing, in fact, becomes *pro tanto* a "surface" printing, and the transparency of which the etching process is capable is sacrificed. Upon the whole, it is better to rely for effect chiefly upon work actually put into the plate with the needle.

It may be useful, in illustration of the foregoing remarks, to consider shortly the practice of Rembrandt, so far as it may be gleaned from such a plate as the "Christ healing the Sick." The work is too well known to need description, and it will be sufficient to call the reader's attention to the several portions of it as they are brought in review for the present purpose.

In the broad light to the extreme left of the spectator—the principal light of the picture—it will be noticed with what simplicity the group of figures is rendered. The details are merely sketched in, either with dry point or in lightly bitten lines—no attempt being made at elaboration, but much white paper left, both for the sake of contrast, and in order to show to full advantage the expressive drawing. At the base of the picture on the same side will be seen a passage in half shadow worked entirely with freely drawn simple lines, firmly bitten but quite open in arrangement. Continuing to the right, towards the figure of Christ, the work passes into shadow and becomes closer, and in this figure itself, much of which is in half shadow, it reaches an extreme degree of delicate finish.

Upon the dress is seen the shadow of the uplifted hand of a figure farther to the right worked in dry point so closely that the magnifying-glass scarcely resolves it into its component lines. The group of which the last-mentioned figure forms part is in half shadow, and is also very closely worked. From it we pass on to an old couple in strong light, the man leaning on a staff, and being helped forward, and beyond these to the figure of the ass, and the figure seated by it, which are both sunk in shadow of great depth and trans-

parency ; this also pervades much of the right-hand portion of the picture, and reaches its profoundest depth in the space immediately above the figure with uplifted hand above referred to. The etching is an epitome of every kind of working, and will repay the most careful study in all its parts, and it is scarcely possible to conceive anything more consummate than the art displayed in the gradation to which the transparency of the deep shadows is due. It appears to have been obtained by crossing in every direction the more or less heavily bitten lines with others closely worked, both bitten and in dry point, in which use is made of the bur for enrichment, while in some of the darkest portions a heavy tint of ink has been left upon the surface of the plate, and printed.

#### VIII.—METHODS OF WORKING.

The foregoing chapter has been devoted to a discussion of the principles which should regulate the actual working with the needle. It remains to consider the various methods according to one or other of which the plate may be executed.

By the old practice, which is still very generally adopted, the etcher completes the whole of the needle-work before any portion of it is bitten. The plate, having its back and edges previously protected with varnish, is then immersed in a bath of the mordant, and the whole of the lines are bitten to the depth required for the palest passages. The plate is then removed from the bath, washed in pure water and thoroughly dried, and those passages which are to remain at the depth already attained are varnished over, or, in technical phrase, "stopped out." The coat of stopping-out varnish being dry, the plate is again immersed in the bath, and the unstopped lines bitten to the depth required for the passages next in strength to the palest. These are in their turn stopped out, and the plate proceeds by similar steps of alternate biting and stopping out until the darkest passages

have attained their full desired strength. The plate has then passed its first stage, and having been cleaned from the ground and stopping-out varnish, is ready for the printer.

There are several kinds of stopping-out varnish in use. For the back of the plate a very liquid solution of Brunswick black in turpentine is excellent and dries quickly, and may be applied as follows:—The plate being placed in a leaning position with its face to the wall, the varnish is brushed over it in horizontal strokes, which run into and overlap each other, and thus form a compact coating.

For the stopping out of bitten lines the same varnish will be found useful, when it is not intended to work upon the passage again with the needle. When, however, fresh work has to be added, a solution of asphaltum and wax in turpentine is to be preferred, as Brunswick black becomes, when dry, too brittle, and is apt to chip away from the plate. The proper consistency of the varnish is important. If this is too thick it fails to reach the bottom of the more deeply bitten lines, and these remain practically unprotected. On the other hand, if it is very liquid, and applied incautiously with a full brush, it is apt to run along the network of the bitten lines, and to stop out passages intended to be reserved for further biting.

It is sufficient for the varnish to be “surface” dry before the plate is replaced in the bath, but it is of the highest importance that the plate should have become thoroughly dry before the varnish is applied, in default of which the latter fails to adhere to the plate; and care should be taken, in washing, to remove from the plate every trace of the mordant, the salt in which, being deliquescent, has a tendency to prevent the varnish from adhering.

It may seem unnecessary to insist upon the importance of *thoroughly* stopping out the lines, but without the closest scrutiny the ends of delicate lines are rather apt to be overlooked, and what is at first an infinitesimal defect becomes, during the subsequent biting, a fatal disfigurement.

As the turpentine in the varnish has the effect of making the brush harsh and brittle, the latter should after use be washed, first in linseed oil, then with soap and water, and finally with plenty of clean water.

The above method of procedure—known among the French as *par couvertures*—was until recently the only process in use by which advantage could be taken of varying degrees of biting. A difficulty attends it in cases where lines of various depths have to be intimately commingled.

In landscape, for instance, it often becomes necessary, with the view of expressing either the gradation and transparency of shadow, or the tangled intricacy of multitudinous foreground detail, to associate in close contiguity lines of many various degrees of depth. This it is practically impossible to do by any system of mere stopping out, and in treating such passages the practice had obtained of restricting the earlier biting to lines of uniform depth, and reserving the completion for a subsequent stage of the work, when, the plate having been cleaned, and a fresh ground laid, the paler lines are added, and bitten separately. In certain respects this is the best plan to adopt. The attention being confined to the biting of one set of lines at a time, it is unnecessary to consider the effect which the acid is taking on lines previously laid, and, as between each successive operation a proof can be taken of the plate, the etcher is enabled to feel his way, step by step, to the realisation of the effect which he desires. But it is necessarily somewhat tedious, and the method next to be described, which has latterly come much into use, affords some of the same advantages, without the delay which cleaning and regrounding the plate involve.

In the year 1866, Mr. Haden, to whom on so many accounts Etching is deeply indebted, published in the "Fine Arts Quarterly Review" his plan of working from nature upon the plate while in the mordant bath. Of this method, simple as it is, it is not too much to say that its introduction marks an epoch in the history of the art. By its adoption

the troublesome and dilatory operation of stopping out is thrown aside, and the needle-work and biting are carried on simultaneously. The plate, properly protected as above described, is placed in the bath, and the etcher, working with a point which the acid will not corrode, begins by needling the heaviest passages of his work, and passes on, with such intervals as are necessary for the careful consideration and selection of his lines, to those of less depth, and so on to the palest.

As the acid is in action during the whole time, and seizes upon the lines as they are successively drawn, a gradation in their depth is secured, and, theoretically at least, as many differences of depth are obtained as there are lines in the picture.

The process has its own difficulties. In the first place, it admits of no *locus penitentiae*. A line once drawn must, together with any defect or accidental injury to the ground, remain, and work its way for weal or woe during the remainder of the sitting. For this reason unerring draughtsmanship is essential to success. A precise relation, moreover, must exist between the rate at which the needle-work is executed and that at which the acid will corrode the metal; and, as the latter depends much upon temperature, it follows that, with acid of a given strength, the size of the plate, or at least the amount of work to be done, must be regulated according to the heat of the weather. And it should be observed that the variation in depth between lines consecutively laid is in reality so slight that, except in very slightly bitten work, it fails to give the effect of gradation; and, unless considerable pauses are made in the execution of the needle-work, so as to secure much diversity in depth of line, the effect is apt to be monotonous. On the other hand, where a pale even tint is desired to be formed by lines of slight depth over a large portion of the work, it is often difficult to execute them with sufficient rapidity to secure the desired uniformity. Although the process, under the skilful

and practised hand of its inventor, has yielded brilliant results, it has done so rather in spite of its inherent difficulties, and these are, in fact, so considerable as to render it unsuitable for any but an experienced etcher to practise.

The difficulties, however, are due to the fact that the plate is executed in the bath, and they may be avoided without abandoning the essential principle of commencing with the darkest passages and working up to the palest. This may be equally secured under the following modification—practicable when the etcher has the opportunity of recurring to his subject, and executing the plate at successive sittings. The operations of needle-work and biting are here separated—the former being done upon the dry plate in successive detachments—the darkest first—and bitten between whiles to the depth required. Theoretically the gradation is not so uniform as when the action of the acid is continuous, but it is more appreciable, and the operations are far more under control than when they both take place simultaneously. It will be found, practically, that (with the assistance of variety in the closeness of the needle-work) all necessary gradation may be secured, and monotony avoided by dividing the process of biting into about six different stages, which may be arranged in the following proportions:—Taking the heaviest biting as represented by the number 24, and the palest by the number 1, the successive steps would bear the relation to each other of 24, 12, 7, 4, 2, and 1.

In the proposed method, the darkest lines are first needled, and bitten to a depth represented by 12—*i.e.* to one-half of their ultimate depth. The plate having been removed from the bath, washed, and dried, the lines next in strength are needled, and bitten to a depth represented by 5, when the lines first laid will have reached a depth represented by 17; a third needling then follows, and a biting for a depth of 3, when the first-laid lines will have reached a depth of 20, and the second a depth of 8; after which the same process is repeated for a depth of 2. Two further needlings and bitings

follow, each representing a depth of 1, at the conclusion of which the lines first laid will have reached their full depth of 24, the palest a depth of 1, and the intermediate lines their respective depths of 12, 7, 4, and 2.

In order to illustrate the various modes of working above described, it may be well to detail shortly the history of the accompanying plates. The etching of "The Tryst" was executed in the first instance *par couvertures*, and "The Barn Door" (of which the finished plate forms the frontispiece to this volume) partly by the same method, and partly by that of successive needlings, as lastly described, and as they were both executed expressly for this work, it has been thought well to give impressions of them in two successive states. The account of their completion will be found under the head of "After Processes."

Both of the plates were bitten under the same conditions, viz. under a temperature of 60 degrees Fahr., and with a mordant composed of 1 oz. of chlorate of potash to 5 ozs. of hydrochloric acid and 19 ozs. of water.

In the case of "The Tryst" the whole of the needle-work, as it appears in the first state, was executed at once, and bitten for five minutes. The distant foliage and sky were then stopped out, and the plate was bitten for five minutes more; after which much of the roof and pathway, and portions of the low shrub by the arbour were stopped. Then followed successively—a biting for ten minutes, a stopping out of the remainder of the roof, the lighted side of the arbour, and the figure; a biting for thirty minutes, a stopping out of the remainder of the walk, parts of the tree-stems and branches, and the paler lines of the foliage; and a biting for forty minutes, which completed the plate except the foreground laurel, which was treated with a strong solution of nitric acid.

In the subject of "The Barn Door" all the needle-work was executed together, except in the dark passage under the roof, where the lines were left very open to admit of enrichment

later on, and the plate was bitten for five minutes. The distance and the straw in the bay were then stopped out, and a further biting for five minutes given. This was followed, successively, by a stopping out of the light side of the upright support inside the barn, much of the near barn doors, and of the straw in the foreground; a biting for ten minutes, a stopping out of the distant door, and upper part of the lintel of the near door; a biting for thirty minutes, and a stopping out of the figure, the fowls, the remainder of the straw in the foreground, the lintel, and all the remainder of doors and walls except very dark lines of joints. At this point the dark hollow under the roof received a large amount of enrichment, some of the timbers, on the other hand, being partially stopped out. The plate was then bitten for seventy minutes, and all stopped out except the darkest hollows under the roof, which were treated with nitric acid.

The plate of "The Larch Wood" was executed by successive needlings, as follows. The present impression is hand-wiped, a richer one appearing later on to illustrate the chapter on printing. The mordant used was of the strength of 2 ozs. of chlorate of potash, 10 ozs. of hydrochloric acid, and 88 ozs. of water; but the temperature was low, the plate having been executed in winter.

The first sitting (a very short one) was devoted to the outlines and dark markings upon the pale stems of the nearer trees—the darkest shadows and lines in the tangled underwood of the foreground—the crouching cat—and the hollow beyond the dead rabbit. The plate was then bitten for ninety minutes. At the second sitting the remainder of the tree-stems were outlined, and their darker portions completed in somewhat close work, but, as much of these stems was hidden by a veil of sprays, those portions were left for subsequent work. At the same sitting much of the heavier branch work and underwood was also needled, and the dark hollows of the foreground further worked upon. After the second sitting the plate underwent a biting of thirty minutes,

at the expiration of which, the greater portion of the sprays and smaller branches of the trees were needled, the foreground much worked upon, and the horizontal work upon the half-shadowed tree to the extreme right was also put in. And, after another biting of thirty minutes, the needling of the sprays and foreground was completed, together with the open horizontal shading upon the nearer tree-stem to the left. A final biting of thirty minutes completed the etching, at the close of which the heaviest lines had been bitten for a hundred and eighty minutes, and the others, according to depth, ninety, sixty, and thirty minutes respectively. The plate was afterwards enriched with dry-point work, and by the same means the grey tint was also given to the stem nearest the spectator.

A comparison of the plates will probably afford some idea of the advantage referred to above as attending this latter method of working, when it is desired to express the transparency of shadow, or the tangled intricacy of foreground detail.

The accompanying small plate of "The Brook" \* was executed *par couvertures*, and the greater part of the needle-work was finished upon the spot, when the writer was from home,

\* The plate of "The Brook" was intended to illustrate the first stanza of Tennyson's poem of that name. In spite of the sage advice which the elder Mr. Weller so impressively delivered to his son upon the subject of "talking poetry," the writer is tempted to transcribe the following lines, which accompanied the presentation of a copy of the etching to a friend.

"I come from haunts of coot and hern,  
I make a sudden sally,  
And sparkle out among the fern,  
To bicker down a valley."

TENNYSON.

So sings the streamlet, through the glen  
With soften'd murmur stealing,  
Unto the changeful race of men  
A changeless life revealing.

So sang the bard, with tuneful ease  
His pregnant lines inditing,  
In word-wrought pictured images  
The streamlet-life reciting.

and without the necessary appliances for biting in. In all the darker portions the lines were left very open, in order to receive further work at a later period. The plate was then bitten in four stages, cleaned, and a proof taken, and, having been regrounded, much enrichment was added by means of bitten work, and, ultimately, of dry-point as well.

It is a matter of frequent observation that lines which have been executed after the plate has undergone a long immersion in the mordant bath are more readily attacked by the acid, and are widened with greater rapidity than those executed before the commencement, or in the earlier stages of the biting process; and that the ground, after long immersion, ceases to afford to the copper as complete a protection as it did at first. It must be borne in mind that both in Mr. Haden's original process, and in the above modification of it, the ground over the entire plate is undergoing this weakening effect of the mordant during the whole time of immersion. This, unless guarded against, might lead to foul biting in passages where it would be fatal to the purity of the

So sang the bard—Ah ! not for me  
That flowing verse to follow,  
To mock the magic minstrelsy  
With feeble voice and hollow.

Rather I'll try a lowlier task.  
(Each to his calling proper.)  
A needle-point is all I ask  
Upon the polish'd copper.

And let me take one foreground "bit"  
From all the wealth beside me,  
And soothly, simply pencil it,  
With Nature here to guide me.

Perchance, like message voyaging  
Beneath the carrier's pinion,  
My work, beneath the Poet's wing,  
Shall soar through Fame's dominion.

Frail offspring of a deathless rhyme,  
The picture may inherit  
More life within the coming time  
Than its own strength doth merit.

lights, and whenever the etcher entertains any doubt as to the integrity or strength of his ground, he should execute the paler passages of his work, bite, and stop them out during its earlier stages. Even where there is no reason for apprehension in regard to the ground, and the precaution above suggested is therefore deemed unnecessary, allowance should still be made, in biting pale passages executed during the later stages of the work, for the increased rapidity with which the mordant then acts upon the plate.

The methods thus far considered assume that effect is sought by much variation in the depth of biting; and in the case of large plates it is essential that portions should be deeply bitten, in order that power and solidity of work may be insured. In small plates, however, it will often be found that, with a single biting, sufficient variation is attainable by judicious management of the needle-work—either by using needles of various degrees of fineness, or by varying the pressure of the hand in working, causing the needle in the heavier passages to penetrate the copper, and thus to accelerate the action of the mordant. It is needless to point out that, in a plate intended for a single biting only, the dark passages should be closer in work than those which are to be pale—depth of shadow being, as before observed, in proportion to the juxtaposition of the lines. It has been pointed out that, owing to the comparatively large surface of metal exposed to the acid in a closely-worked passage, and the increased amount of chemical action going on, the temperature at that point rises, and in its turn accelerates the action of the mordant, and that, even with a single biting, closely worked lines are thus more rapidly bitten than those which are more open. That in the case of an effervescent mordant the ebullition is more active, and the lines more rapidly widened where they are close together, is true; but there seems reason to attribute this result rather to the mechanical action of the effervescence in causing the ground to break away from the edges of the lines. In comparing, under the

microscope, a closely-worked passage with an open one on the same plate—both bitten for the same period by a nitric acid mordant—the writer found the actual lines to be all of the same strength, but each line in the close work was flanked on both sides by a broad margin of shallower biting, entirely absent from the lines which were far apart, and due, it would seem, to the breaking away of the ground. In the case of work, on the other hand, bitten by a still mordant, he has found it impossible under the microscope to detect any difference between the respective widths of lines placed close to each other, and of those placed far apart, all of which had been subjected to one uniform biting.

The plan above mentioned of immersing the plate in a bath of the mordant is of comparatively recent introduction, and, as the old practice may under certain circumstances be found convenient, it will be well shortly to describe it. Round the margin of the plate, on its grounded side, a ridge of wax is raised about half an inch in height, converting the plate into a shallow dish which retains the mordant when poured over it. In order to render the joint between the wax and the plate impervious to liquid, a thick iron wire, bent to a suitable curve, and sufficiently hot to melt the wax, should be passed along it, and at one corner of the plate an opening should be left for the purpose of pouring off the mordant—such opening being at other times closed with a pellet of wax. The bordering wax may be prepared by melting seven ounces of beeswax and twelve ounces of Burgundy pitch together, and adding thereto one ounce of olive oil. It should be then poured into tepid water, and formed into strips for use, and it requires to be slightly warmed before being applied to the plate.

The method is, of course, inapplicable when the needle-work is carried up to the edge of the plate, and the operation certainly involves rather more trouble and delay than the method with the bath. On the other hand, the plan of leaving a margin round the needle-work is for many reasons

a convenient one, and the etcher may find the method, old-fashioned as it is, useful in such an emergency as the breaking of his bath when he is far from his base of operations. Even without such a catastrophe, he may when travelling desire to dispense with the encumbrance of a large and heavy bath, and this the plan in question enables him to do.

#### IX.—MORDANTS.

The subject of working with the needle and that of "biting in" are so intimately connected that, in treating of the former, it has been found unavoidable to anticipate many things which might have been properly reserved for the present chapter. There are, however, several points which concern the mordant alone, and these now call for discussion.

The mordants at present in general use may be divided into two classes, according to their action upon the copper being accompanied or not by ebullition caused by the escape of gas; and, as some rather important consequences flow from this characteristic, it will be well to treat of them separately. Opinions appear to differ as to their relative excellence. The worker with nitrous acid is sometimes heard to inveigh against nitric as being less certain and even in its action, while the worker with nitric condemns the hydrochloric mordant as liable to yield a ragged line, and thus to fail in crispness of biting. The truth is that, as "a good horse cannot be of a bad colour," so a good etching cannot be executed with a bad mordant—in other words, the excellence of a mordant is proved by its success, and, as first-rate results have unquestionably been obtained from each of the above-named mordants, and some etchers appear to work equally well with either of them, the writer is disposed to attribute their alleged defects rather to inexperience on the part of the operator, than to any cause inherent in the mordant itself.

The nitric and nitrous acids are so far similar that their action is accompanied by the evolution of much gas, which incessantly rises in the form of bubbles. These increase in size, and, unless removed, form a partial protection to the copper, and thus lead to irregularity in biting. They should, therefore, be from time to time brushed away either by a feather or a small brush of spun glass, or the unravelled end of a piece of string drawn through a glass tube and so held—anything, in short, which will effect the purpose without disturbing the ground. The operation requires close attention, but it has this advantage, that it affords a safe guide in estimating the depth to which the biting has proceeded. The ebullition is, of course, lively in proportion to the action of the mordant upon the copper, and an experienced etcher is able, judging by this indication alone, to regulate the biting of his plate without any reference to the time absorbed in the operation.

Attention has already been drawn to the effect of the mordant in widening the etched line. This is especially noticeable when the biting is accompanied by ebullition, and the form which the section of the line assumes is thus dependent upon the character of the mordant, and also upon its strength. Mr. C. P. Slocombe, who habitually works with nitric acid, and to whose kindness the writer is indebted for the observations which follow upon the use of that mordant, describes the section as having a V shape, modified in the direction of a parabola. In the case of a “still” mordant—such as the hydrochloric—the sides of the section appear to be perpendicular to the surface of the copper at their junction with the latter, though the base of the section is rounded, and it would seem that the ebullition of an effervescent mordant acts mechanically upon the edge of the ground, and thus tends to widen the line at the surface to a degree proportionate to the strength of the acid employed. M. Lalanne lays down the principle that “strong acid rather widens than deepens the lines; mild acid, on the contrary, eats into the

depth of the copper," and the writer, when experimentalizing with very strong nitric acid, and with a ground of no great strength, has found the resulting line take the form, in section, of a shallow segment. The employment of strong acid is, as M. Lalanne elsewhere says, attended with some risk of losing the purity of the line.

The fumes arising from both the nitric and nitrous mordants are irritating to the throat and lungs, and it is desirable to have the mouth protected when watching the biting process, and, as the acid stains, and would eventually burn the fingers, the operator should adopt some means of raising the plate from the bath without bringing the hands into contact with it.

Nitric acid is described in the "London Pharmacopœia" as free from colour, with a specific gravity of 1.42, and it is stated that 100 gr. of the acid are saturated by 161 gr. of crystallized carbonate of soda—by either of which tests the strength of a sample may be estimated. Mr. Slocombe recommends, as most useful for general purposes, a proportion of one part of acid to two of water. The energy of action, however, in biting being immensely dependent on temperature, the proportion should be modified according to the state of the thermometer. At a very low temperature equal parts of acid and water will not act very powerfully, whilst at a very high temperature a smaller proportion of acid than one-third will be found to act well. At a temperature of 70° an ordinary plate should not require more than an hour and a half for all stages of its biting with acid constituting one-third of the bath. The very faintest portion of sky might be stopped out after five minutes' immersion. The shades in the clouds, according to subject and effect, might have ten minutes more, and the extreme distance another fifteen or twenty minutes, according to the effect required. The middle distance might have twenty minutes longer, and the foreground thirty minutes more. The darkest passages might remain for another ten minutes, or until the ground begins

to break up, after which a lightening process begins, and the work retrogrades. The lines, moreover, usually become rough by a long exposure to the acid.

Nitrous acid, which is much used as a mordant, is of a deep orange or red colour. It is, in fact, nitric acid charged with peroxide of nitrogen, to which its deep colour is due. Mr. Law, who has had a large experience in the use of this mordant, has kindly furnished the writer with the following suggestions. The proportion should be one-third of acid to two-thirds of water, and the time to be allowed for biting the palest passages should, except in hot weather, be about fifteen minutes. For the passages next in depth an additional period of twenty minutes should be allowed, and thirty minutes for the next, and, for the deepest passages, an additional forty-five minutes should be given. The biting is thus divided into four stages of fifteen, thirty-five, sixty-five, and one hundred and ten minutes respectively.

It is obvious that a mordant which requires the constant attention of the operator to remove the effervescence from the surface of the plate, and at the same times exhales vapours so noxious as to necessitate his protecting his mouth from their attack, is quite unsuitable for use in Mr. Haden's process of working upon the plate while in the bath, and one of the most important changes which the introduction of that process involved was the use of the hydrochloric mordant. This, according to the formula in the method as originally published, is prepared by dissolving two parts of chlorate of potash in eighty-eight parts of water (which, for the purpose of easy solution, should be warmed), and adding thereto ten parts of pure hydrochloric acid. Its action is unattended with any ebullition, and there is consequently less tendency for the line to become widened than is the case with effervescent mordants, and it is less exacting in its demand upon the tenacity and adhesiveness of the ground. The proportion of acid to the water being so small, the fumes from the bath are comparatively innocuous, and the hands can be freely placed

in it without inconvenience further than that, unless they are washed before the acid dries upon them, the skin becomes stained. The difference between the colour of the lines etched by the nitric and hydrochloric mordants respectively has been pointed out—the latter mordant has the effect of bronzing the line, while the former simply exposes the pure copper.

In working with the hydrochloric mordant, a convenient rule is to double the time of each biting for the succeeding one, or to take the degrees of biting mentioned in the last chapter. The following proportions will be found to act well. Assuming ten minutes as the period for biting the palest passages (and with the thermometer at  $70^{\circ}$ , and the acid in the proportion above stated, this would be the proper time to allow), the whole time required for biting those next in depth would be twenty minutes, and for the other passages, in the order of their depth, the whole times would be forty, seventy, one hundred and twenty, and two hundred and forty minutes respectively.

To the worker with an effervescent mordant, the action of which is much quicker than is the case with the hydrochloric, this may seem an inconveniently long time for the biting to continue. But it must be borne in mind that with the still mordant attention to the process is unnecessary. Assuming the ground and the mordant to be in proper state, the plate may be fearlessly left in the bath until the calculated time for its withdrawal arrives.

The proportion of eighty-eight parts of water is that best suited for working in the bath out of doors, when considerable time is required for the execution of the needle-work. When the needle-work and biting-in are done separately, and greater rapidity in biting is desired, the proportion of water may be reduced to thirty-eight parts.

The mordant is said to lose strength in course of biting more rapidly than is the case with nitric acid. The writer's experience does not bear this out. Bearing in mind its repu-

tation in this respect, he has often been surprised to find with what vigour an old bath will act. Certainly a bath which has been previously used seems to attack the copper in the first instance more readily than one which is perfectly fresh.

A mordant of "chromic acid" has been recommended, prepared as follows:—Three parts of bichromate of potash are dissolved in sixteen parts of warm water, to which are added four parts of sulphuric acid. It is free from noxious exhalations, but is so slow in action as to be practically of little use, and it is so dark in colour that the plate requires to be removed from the bath in order that the effect upon the copper may be observed.

It was the writer's intention to illustrate this part of his subject with etched examples, showing the depth of biting obtained by each mordant at a given temperature and during various periods suitable to each. Such examples, however, are in reality less useful than might be anticipated, owing to the problem being complicated by so many extraneous considerations. Coppers are not all of the same density—acids are not of uniform strength—and, although an even temperature may be maintained by artificial means, it is by no means certain that it is temperature alone which affects the rate of biting, which, there seems reason to believe, is dependent also on other atmospheric conditions. Much diversity in depth is also occasioned, especially in the paler bitings, by the degree to which the needle has been allowed to penetrate the copper, the practice of different etchers varying much in this respect. It is perhaps unnecessary to add that, although we may begin with the mordant at a certain strength, such strength is gradually lessened, and eventually lost as the acid becomes charged with copper. In facing this apparent maze of difficulty and doubt, let the young etcher comfort himself by adopting the maxim (the only one on which he may implicitly rely), *experientia docet*.

In addition to the ordinary methods of biting, that of electro-etching should be noticed. It is thus described in

Cooley's "Cyclopædia of Practical Receipts":—"If two plates of copper be connected with the opposite ends of a voltaic battery, and placed in a vessel containing very dilute sulphuric acid, the plate connected with the copper of the battery will be attacked by the anion oxygen which is released during the decomposition of the acid. This destructive action can be localised at pleasure by covering certain parts of the plate with a protecting stratum of varnish—ordinary etching ground, for instance. In the practice of electro-etching the drawing is scratched in in the usual way through an ordinary ground; a stout wire is then soldered to the plate, and this, as well as the back of the plate, is coated with sealing-wax varnish. Thus prepared, the plate is placed in a suitable decomposition cell opposite to a plate of somewhat similar size, and the two are connected respectively with the copper and zinc of a 'Daniell's' cell, or the silver and zinc of a 'Smee's' cell. After about ten minutes the plate is removed, washed, and dried; and, when the fine work has been stopped out with Brunswick black, it is returned for another space of ten minutes. By alternately exposing the plate to the action of the decomposing fluid and stopping out parts of the work, the required gradation in tints is obtained." Electro-etching has the advantage of being free from the exhalation of any deleterious gas, but the apparatus required, involving a battery and an extra copper plate, is more cumbrous, and the process itself more complicated than is the case with the ordinary methods of biting, and it does not appear to have been adopted for artistic work to any considerable extent.

#### X.—AFTER-PROCESSES.

The plate having been bitten to the depth desired, is now cleaned, both front and back, from the ground and stopping-out varnish, which may be done either with spirit of turpentine or benzole, or, if the plate be slightly heated, with a

little sweet oil. The solvent should be poured upon the plate, and distributed by means of a stiff hog's-hair brush, the use of which will facilitate the breaking-up and solution of the ground. When the latter is thoroughly dissolved, the whole may be blotted off with blotting paper, and the cleansing finished with a rag and a little fresh solvent.

A first or trial proof may then be taken, but it is rarely the case that a plate, other than one of the simplest character, yields at this stage satisfactory results without more "sophistication" in the printing than is desirable, and in elaborate etching, or where much enrichment is sought, the processes hitherto described are executed with direct reference to, and as the ground-work for, much supplementary work.

The use of a deeply bitten line in connection with mezzotint has already been mentioned, and its effect in imparting transparency pointed out. With a similar object, it is often desired to emphasize certain leading lines of an etching to the exclusion of others, to effect which the best plan is to lay a transparent ground, such as is hereafter described, thickly over the whole passage, and then to run the needle along and clean out those lines which it is proposed to deepen, which should then be bitten with strong nitric acid. Lines so treated, if selected with judgment, impart great vigour and transparency to the work, rivalling in solidity and power the heavy work of the burin, while they are free from the mechanical and laboured character inseparable from all burin work.

But it often happens that, either from miscalculation of the effect of a passage in connection with its surroundings, or other cause, the biting is found to be deficient in depth over a considerable section of the plate, and, when this includes intricate work which it would be tedious to re-needle, a better plan is to lay a "re-biting ground," which protects the unbitten surface of the copper, while it leaves the lines open for the attack of the mordant. Where the lines have been firmly bitten this is easily accomplished, but

in the case of tenderly bitten work it is an operation of extreme delicacy, so difficult of achievement that in Paris etchers are in the habit of intrusting their plates for this purpose to a skilled operator who devotes himself to the practice of laying re-biting grounds. In such hands the process becomes practically certain in its results, and the method is often adopted of biting in many successive stages, between which the plate is cleaned and successive proofs are taken. The etcher is thus enabled to feel his way gradually to the depth necessary for his line, and the process of biting, no longer resting upon calculations of time, or estimates of relative strength, becomes one of simple observation. The practical certainty now obtained in laying re-biting grounds is in great measure due to the introduction of the roller, the use of which has been already described in the fourth chapter. In laying a re-biting ground, the roller should be very thinly charged with the paste, in order to avoid filling up the bitten lines, and for the same reason it is essential to use it with the least possible degree of pressure—the mere weight of the instrument being sufficient, when the plate is even, to insure the requisite contact, and it is generally sufficient to pass the roller twice over the part to be covered, the second application being at a right angle to the first. It is, however, obvious that, in order that the roller when applied with so slight a pressure, as above indicated, should reach the surface of the copper uniformly, the latter should be absolutely even, and the fact that this is rarely the case constitutes a considerable difficulty. It may be partially overcome by using a short roller, and for re-biting grounds the rollers are made of much smaller dimensions than those mentioned in the description before given of the implement, but, even with a short roller, it is often found that the plate is too uneven to admit of the ground being applied equally without filling up some of the more delicate lines, and when this is the case the dabber must be employed.

This implement has also been already described. In

using it for laying a re-biting ground, it is usual to spread the latter first upon another plate from which the dabber is charged, and the ground is then transferred to the plate which is intended to be re-bitten—both plates being, of course, heated when the ground is such as to require melting. But in order to avoid filling up the more delicately bitten lines, it is essential that the ground should be applied most sparingly, and it will generally be found that a dabber which has been used in the ordinary way for the first coating of a plate is already sufficiently charged with ground without any addition. The dabber should be applied in vertical touches, and as lightly as possible. If any pressure be used, or a sidelong direction be given to the touch, the lines are almost certain to be filled up. The difficulty of securing protection to the surface of the plate while using a film of such extreme tenuity is only to be surmounted by going over the passage again and again with the most patient care, and for this purpose it is better to work with a coloured ground the film of which is more observable than that of one which is absolutely colourless.

Assuming all possible precautions against failure to be taken, the process remains one of great delicacy, and is rarely free from risk, and when the young etcher, after spreading with infinite pains a re-biting ground over some favourite but too faintly bitten passage, sees the plague spot of foul biting appearing where it should not, and sullying the fair and hitherto unblemished purity of the copper, while the lines which he intended to re-bite persist in ignoring the presence of the mordant, he will be disposed, in bitterness of spirit, to agree with a great modern etcher, whose advice is above all things “never to under-bite,” nor to rely upon re-biting for making good an original defect.

In the above process of re-biting the lines are both deepened and widened, and, when it is successfully carried out, they retain all their original sharpness of definition. In certain exceptional cases this quality may be of less importance than

to obtain greater fulness of tint, and it may be desired to widen the lines without deepening them. This may be easily accomplished by pouring over the plate previously cleaned a thin solution of Japan varnish or Brunswick black in turpentine, which when dry affords protection both to the unbitten surface of the copper, and partially also to the bitten lines into which the solution runs. At the sharp edge, however, of the escarpment which forms the side of the bitten lines the solution will not rest, and here the mordant attacks the copper, and thus widens the line without deepening it. Lines thus treated have a peculiar character, but the process should be restricted to the heavier portion of the work, as when applied generally to the plate the effect is apt to be flat. And, as the lines are widened with great rapidity, care must be taken that the process be not pushed too far.

The best way, however, of imparting richness to a thinly worked passage is by fresh lines, either interspersed with or crossing those already laid, and either bitten or worked with the dry-point. Of the latter we will speak presently. For fresh-bitten work the plate has to be re-grounded, and, in order that the lines already executed may be clearly seen, the fresh ground should be more or less transparent. The bronzed line of the hydrochloric mordant is easily seen through a slightly coloured ground, but when the nitric mordant is used, a white ground formed of wax and gum mastic, in the proportion of about five parts of the former to three parts of the latter, is recommended.

The ground, in the usual form of a ball, should be rubbed over the plate previously heated, care being taken that the lines already existing are filled, and the film should be made of uniform thickness by means of the dabber, which should also insure that the unbitten surface of the copper, and especially the edges of the existing lines, receive their necessary protection—a point less easy of observation with a white transparent ground than with one whose colour differs from that of the pure copper.

Upon the plate so re-grounded the fresh lines are to be worked in the usual way, but it may be well to observe that the needle in working is apt to enter and run along the previously bitten lines unless care is taken to draw the fresh lines, as nearly as may be, at a right angle to the old.

The mordant for fresh-laid work should be of the same strength as for original biting, but for re-biting bitten lines it should be used weak, in consequence of the extreme thinness of the ground. The method of applying it may vary with circumstances. If the work to be bitten be distributed over the whole plate, the plan already described of immersing the plate (previously varnished at the back and edges) in a bath of the mordant may be adopted. When, however, the passages to be operated upon are isolated, the mordant is more conveniently applied by means of a small glass tube (Fig. 5), of about a quarter of an inch in diameter, open at both ends, but tapering at



Fig. 5.

one of them nearly to a point, and having the other end fitted with a hollow india-rubber bulb, such as one of the ordinary feeding-bottle nipples before it has been pierced. In order to charge the instrument, the bulb should be compressed between the finger and thumb, and the narrow end inserted in the mordant, which, on the pressure being relaxed, will mount into the tube. And it may be thence expelled—drop by drop, if need be—and applied to the plate where necessary by simply renewing the pressure upon the bulb. The same implement will also serve to remove the acid from the plate during the continuance or at the end of the biting process, and (where nitric acid is being used) will thus avoid the necessity of brushing away the effervescence.

When enrichment is required in a passage of great delicacy, it is better as a rule to execute it in dry-point, a method of working which now calls for description. Strictly speaking,

this is rather a process of engraving than of etching—a term which should be limited to *bitten* work—but the practice of dry-point is so constantly combined with that of etching proper, that no account of the latter would be complete without some reference to it. The dry-point line is made by simply scratching the copper with the needle, and its strength and character depend much upon the pressure used, but more upon the ridge of metal—technically called the “bur”—which the needle turns up in its passage. The bur retains the ink when the plate is wiped for printing, and, in the hands of a competent printer, it imparts to the proof the valuable and well-known effect of velvety richness so characteristic of the work. This effect is not suited to every subject, or to every passage, and, in cases where the clean and simple line is preferred, the bur must be removed by means of the scraper. But its removal materially reduces the strength of the line, and hence it is necessary, before dry-pointing a passage, to decide whether, and to what extent, the bur is to be allowed to remain—a much heavier pressure upon the needle being required for a given strength of line when it is intended that the bur should be removed than when it is to be left. In using the scraper it should be placed flat upon the copper, its edge at a right angle to the line to be operated upon, and the instrument should be used in the direction of the line. It should be held lightly in the hand, and allowed to play over the surface of the plate. The degree to which the bur has been removed should be from time to time ascertained by rubbing over the line a mixture of lamp black and tallow, and then wiping the plate; or a similar result may be obtained by charging the finger with powdered whiting, and rubbing it gently across the line. To avoid the difficulty of not being able to see the dry-point line when first executed, it is sometimes recommended that the plate should be grounded in the usual manner, and smoked as for biting—the ground being removed as soon as the dry-pointing is completed, and before scraping. With a little practice,

however, the difficulty, such as it is, will probably be found to vanish of itself.

The accompanying plate, which represents a scene upon the river Llyfnant, in North Wales, has been worked entirely in dry-point, none of the lines having been bitten. And the effect is in great measure due to the varying degree in which the bur has been allowed to remain upon the plate.

The sharpening of the needle for dry-point work is a matter upon which difference of opinion appears to prevail—some operators being in favour of the needle being sharpened with a cutting edge, while others contend that it should be round. In truth, the sharpening should depend upon the work to be executed. When the lines to be laid are approximately straight lines, or their freedom is a matter of little or no importance, it is well to have the needle sharpened to a cutting edge; in fact, it is a good plan to have one ground after the manner of the blade of a penknife—one great advantage being that when the point becomes blunted by use it is more readily sharpened than when the section of the needle is round. But for lines in which freedom of handling is required, a point so sharpened would be found unmanageable, and a round section is to be preferred.

A needle burnished as before described should afford perfect freedom of manipulation. With one unburnished much depends upon the position in which the implement is held, freedom of movement being best secured by holding the needle as nearly as possible perpendicular to the plate. It has been pointed out by Mr. Hamerton that less bur is caused when the needle is so held, than when it is used in a slanting direction.

It sometimes happens that a plate has been too heavily bitten, and it becomes necessary to reduce the depth of the lines. When a large portion of the plate has to be so treated, the best plan is to plane it down with willow charcoal as described in the second chapter. But when the defect embraces a small area only of the plate, or a single line or

speck of foul biting, the use of the "snake stone" is to be preferred. This may be procured in the form of slender pencils which can be sharpened to a rounded point, so that its application can be effectually localised at pleasure. Its action is more rapid than that of the charcoal, but it leaves the surface of the copper rough, and this necessitates a slight supplementary planing with the charcoal, which, in its turn, should be followed by polishing with crocus powder and oil. Another effectual method of reducing small passages or single lines is by means of the burnisher used with considerable pressure, and when the biting has extended far down into the copper, the surface of the latter may be scraped or cut away with the scraper.

The accompanying prints from the finished plates of "The Tryst" and "The Barn Door" (the latter appearing as our frontispiece) will serve as illustrations of some of the after-processes above described, and they should be compared with the prints from an earlier stage of the same plates which appear in connection with the chapter upon "methods of working."

In the case of "The Tryst," a fresh ground was laid upon the plate, and some of the leading lines in the stem of the nearest fir-tree were re-needed, and deepened with nitric acid. The pale lines on the posts which carry the arbour roof, and some additions to the distant trees beyond the figure, were also needled and bitten with the hydrochloric mordant for five minutes. The paler portions of the nearest tree-stem, the roof of the arbour seen between the tree and the margin of the plate, the lighter parts of the arbour wall, and some of the lines on the pathway were then reduced by means of the burnisher. The arbour roof received much tinting by means of dry-point, and dry-point lines were added to the figure, the pathway, and the posts—from all of which the bur was removed. The dark hollows of the fir-trees were also enriched with some heavy dry-point work, and here the bur was allowed to remain.

In the plate of "The Barn Door," the additions were confined to dry-point, and they consist of enrichment in the distant trees, the door beyond the figure, and the fowls in the foreground, passages of shadow on the straw in the barn and on the floor, and added lines on the nearer doors and in the foreground. And the lines in parts of the framework of the doors were reduced by burnishing.

It often happens that, in removing foul biting, or reducing over-bitten lines, the surface of the plate becomes so far depressed that the etched work within the area operated upon either altogether fails to print, or yields a comparatively feeble and deadened impression. In such cases, the surface must be levelled up by hammering at the back of the plate, which for this purpose should be placed face downwards upon a flat and polished anvil of steel—the spot to be operated upon being ascertained by means of a pair of calipers.

Before the plate is handed to the printer, the edges should be smoothed and bevelled to get rid as well of foul biting, due to the chipping of the varnish, as of the sharp front edge of the copper. In default of this being done, the edge of the plate is apt to leave an unsightly mark round the proof, if it does not actually cut through the paper, which it not unfrequently does in the case of Japanese paper. The bevelling is easily accomplished with a rough file, to be followed by a finer one, and finished with a burnisher.

## XI.—PRINTING.

In bringing the plate to completion by any of the after-processes above described, there is a manifest danger of carrying the application of them too far, unless progress is from time to time reported by the taking of trial proofs, and the etcher will generally find it answer his purpose to have the means of taking these in his studio. In default of this, unless he is in the immediate neighbourhood of some competent printer of etchings, it is difficult for him to become

aware of the state of his work. And it should be observed that, for the purpose of testing the capabilities of a plate, it is not of the slightest use resorting to an ordinary copper-plate printer, the treatment in printing of a copper-plate engraving and that of an etching being perfectly distinct, and conducted upon dissimilar, not to say antagonistic, principles. Even when ready access is obtained to a good printer, and assuming that he is always at liberty to take a plate in hand the moment it is presented to him (in most cases a very large assumption indeed), some time is unavoidably lost in resorting to him, and that step-by-step method of proceeding which, in working up a plate, is so great a desideratum, and which, when the etcher has the means of proving his work at hand, is easily compassed, becomes out of the question. The etcher, therefore, is strongly recommended to furnish himself with the requisite apparatus for proving his plates at home, and to make himself so far master of the printing process as to be able to dispense with professional assistance, at least until the plate has been brought to completion.

It will, perhaps, be convenient to describe in the first place the appliances necessary for plate-printing generally, and afterwards to explain their use, pointing out such special modifications of the printing process as are adopted in the case of etchings.

The press (Fig. 6), which first claims attention, consists of a frame furnished with two horizontal rollers, an upper and a lower one, between which travels a horizontal plank or table carrying the plate, and moved as the upper roller is turned by means of levers attached to it—the pressure exerted by the rollers upon the plate being regulated by screws working in the frame. In the selection of the press the following points should be observed. The plank should be of sufficient width to allow some margin beyond the largest plate for which it is likely to be required. Etchers often begin with plates of exceedingly modest dimensions, and are sometimes

led, on economical principles, to content themselves with a small press of, say, eight or ten inches width. The economy seems false. As increased practice leads to greater facility and certainty of manipulation, it is often desired to work upon a larger scale, and the annoyance is great to find one's self stopped in so doing by the limited size of the press. It is therefore recommended that the plank should be not less

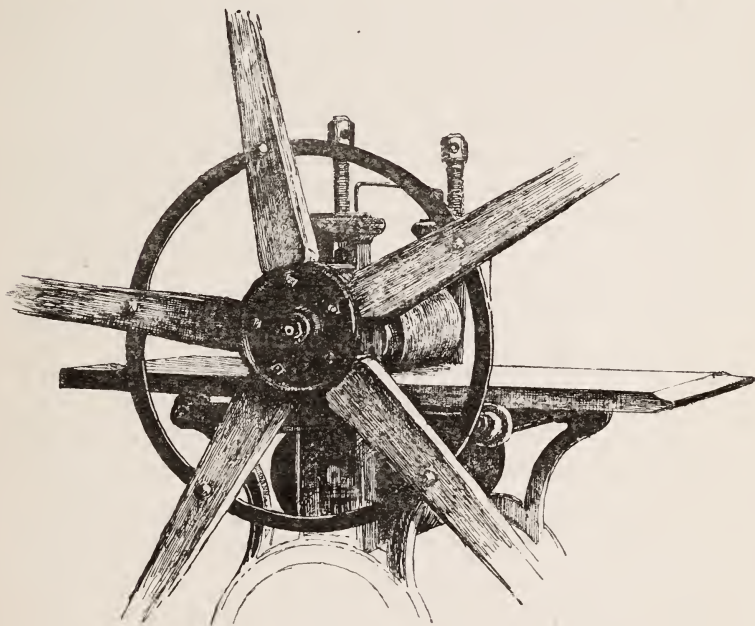


Fig. 6.

than fifteen inches in width; which, as the frame extends beyond it, will admit half a sheet of paper of imperial size, and will easily accommodate a plate of which the shortest measurement is fourteen inches. The plank was formerly always made of wood; at present it is not unfrequently made of iron, and each material has its advocates. On the one hand it is urged that the rigidity of the iron is apt to crush the ink out of the more deeply bitten lines, and thus

to impair the crispness and transparency of the darker shadows—and it is a fact that some of the best printers both in Paris and London have, after using iron, abandoned it, and returned to the wooden plank. The advocates of iron, on the other hand, maintain that this tendency can be neutralised by placing a sheet of cardboard upon the plank, but which, it is presumed, would require frequent renewal. It is sometimes said that an iron plank being planed by machinery can be made more true than a wooden one. The latter, however, can be made quite as true as the former, if sufficient skill, care, and time are devoted to its manufacture, as is proved by numberless cases.

Of the rollers, which should of course be turned perfectly true and smooth, the upper one is the smaller, and for a plank of fifteen or sixteen inches wide, should not exceed five inches in diameter. It is often made larger than this, but it is obvious that the shorter its radius, the smaller will be the surface of the roller acting upon the plate at any given moment of its passage through the press, and the more concentrated will be the pressure—resulting in economy of labour in turning the levers. The lower roller should be of twice the diameter of the upper. With the object of economizing labour, the levers for turning the upper roller should be not less than three feet six inches, measuring from the axis of the roller to their extremity.

When the plank is of wood, a thin plate of zinc of its full size should be laid upon it to carry the plate, for which it affords a more compact bedding. It also tends to distribute the pressure on the plank, which would be otherwise confined to a restricted area corresponding to the size of the plate. The plate for heating the copper plate has been already described.

The ink for plate-printing can be procured ready-made at any establishment where printing materials are sold, but the etcher is strongly recommended to make his own. Besides the advantages of insuring the use of the best materials in its

manufacture, and of having the ink fresh as required, it is upon its character both as to colour and consistency that the success of the printing process in great measure depends, and it is desirable that these should be varied to suit the plate about to be operated upon. In the case, for instance, of a faintly bitten plate, a strong ink—strong both in colour and in the oil—should be used to insure the lines retaining as much colour as possible; for a heavily bitten plate it is often desirable, on the other hand, to moderate the depth of the ink by toning it. The ink is made by grinding the colours with burnt linseed oil upon a stone slab by means of a muller. The oil should be procured of two strengths—one very strong (much burnt), the other thin, by the mixture of which any desired degree of stiffness may be obtained. The black pigments are generally Frankfort black, a somewhat variable substance, the best samples of which yield a very rich ink, and are easily ground; or Paris black, which is more brilliant, but requires longer grinding; and they may be toned by such pigments as burnt sienna or burnt umber, or in some cases by a mixture of lake and Prussian blue. The grinding should be carried on until the materials are reduced to the condition of a smooth “impalpable” paste, which on being spread by the spatula or finger fails to afford any sign of granulation or grittiness; and, in order that the tint of the ink may be easily observed, it is recommended that the slab should be of a pale colour. The ink is applied to the copper plate by means of a dabber consisting of a short thick roll of cloth or flannel, one end of which is covered by a smooth piece of similar material, and is used for applying the ink, while the other serves for the handle. The muslin for wiping the plate is an important item. It should be of two sorts—one very open, for wiping the ink from the plate; the other fine and soft, for finishing. The best muslin of the coarse kind is made in Paris, where it is said to be a relic of the Second Empire, having been originally introduced to supersede crinoline for preserving the amplitude prevailing

in the ladies' skirts of those days, and its manufacture has been continued to the present day chiefly on account of its use in the printing process. It is very open, and at first rather stiff, but loses its stiffness with use. For finishing and *retroussage* any very soft and fine muslin will serve. The blankets used in printing are also of two kinds—one of a very fine material, like the finest cloth, for "facing;" others of thick soft blanketing, for backing, to go next to the roller.

The selection of the paper to be used in printing the proofs depends in great measure upon the character of the plate, and it is so much a matter of individual preference that it would be idle to recommend any one kind to the exclusion of others. But it may be useful to enumerate some of those more generally used, pointing out their respective characters, together with any special mode of treatment which these render necessary. And first let us mention, in order to discard it, the smooth white plate paper used for the printing of engravings, as utterly wanting that picturesque character alone suitable for the printing of etchings.

Among other English papers, a very serviceable one is that upon which the ordinary prints of "The Etcher" are printed, and which has been used in this volume. It is easily managed, readily damped by sponging, and is of a pleasant tone, and its slightly ribbed surface contrasts agreeably with the smoothness of the plate-mark. It is, moreover, suitable for almost every kind of etching. A more costly paper is Whatman's drawing paper, which is especially adapted to bring out powerful and rich plates; and a still more expensive one—the cream of English papers—is Whatman's "vellum" paper. This admits of the utmost richness in heavy work, and its exquisite surface gives an especial charm to passages of a more delicate and tender character, but it is whiter than the common Whatman. The latter is a hard paper, and is not easily damped, requiring very long soaking, and to be passed through the press—

several sheets together, between two plates of zinc—with light pressure. This insures thorough and uniform damping, while the excess of moisture is driven out. The “vellum” paper is softer, and takes up water freely, and it may be damped by mere sponging. Much of the old English and Dutch paper, from which the size has perished, is most valuable for the printing of etchings, having acquired from age a delightful tone, and showing generally a strong watermark, which adds to its picturesque character. A modern Dutch paper by Van Gelder is of excellent quality and appearance, but somewhat over-sized. The size, however, can be sufficiently removed by soaking the sheets in tepid water, and passing them through the press as before described.

In the present day a preference is often shown for Japanese paper—a term that includes a large number of very dissimilar products, both in colour and texture—some being of a soft velvety character, yielding excellent results with every kind of work, while others are so harsh and “dry” that no amount of “treatment” in wiping the plate will avail to render the proofs other than thin and staring. The high reputation of Japanese paper seems to have been originally due to a certain silkiness which the manufacture of former years succeeded in imparting to its surface, and it is said that silk was formerly used in making it.

At present, as we learn from Miss Bird’s “Unbeaten Tracks,” it is made from shoots of *Broussonettia papyrifera*—plants of *Buddlia* and *Hibiscus* being also used mixed with the bark of the former, and the above-mentioned silky texture is rarely met with. Perhaps the nearest approach to it is to be found in some of the Japanese tissue paper, manufactured, it is said, for copying purposes, in which the writing penetrates many sheets together. It is far too tender to be used separately in printing, but, when used as an *appliqué* upon a thicker Japanese, after the manner of India paper, it gives an exquisite surface for the printing of delicate work. The

difficulty of its manipulation, however, renders it unsuitable for large plates.

But although the old silkiness may be no longer attainable, there are other qualities which render many of the modern Japanese papers, when in the hands of a skilful printer, of high value. They are for the most part of a delicate pale straw colour, and being semi-transparent, they impart to the proof, when mounted on a backing of pure white, a certain tenderness of hue unattainable by any other means. The velvety surface of some of them has been already mentioned, and these when properly treated afford proofs of great softness and richness combined, while some of the smoother kinds are admirable for proofs in which clearness is a desideratum. It should be observed, however, that there is always a tendency in these papers to yield proofs of a dry character, and in order to counteract this it is necessary that the plate should be left richer—that is, with more ink upon it—than is necessary or desirable when dealing with other kinds of paper, while, owing to the peculiar “felty” nature which is an almost universal characteristic of the Japanese papers, it is necessary to work with much greater pressure upon the rollers than is otherwise required, in order that the paper may be driven into the finer lines of the plate.

Owing to the demand which has recently arisen for Japanese paper for the printing of etchings, more care has been devoted to its manufacture for this purpose, with the object of securing greater purity in the pulp, and a smoother surface; and the paper which is now obtainable from the Imperial works shows in these respects an improvement.\* The sheets are more uniform in texture, and the surface equal to the finest vellum—for printing they are indeed far superior to vellum—but the colour is almost white, and although for delicate work the surface leaves nothing to be desired, it is not quite so well adapted for heavily bitten plates as some of the “velvety”

\* The paper is described as manufactured at Shioshibu-Insatsu-kioku Tokio, Japan.

papers to which reference has been made. One advantage it has over other Japanese papers—that there is less tendency for the proofs to be “dry” in character.

Japanese paper can be easily damped, being of a spongy nature; the danger, in fact, is that it should be too wet, in which case it resists the ink, and a faint grey proof is the result. In common with all thin and delicate papers, it should be used with a backing of thick plate paper, also damped, to protect it from any accidental crease or irregularity in the blanket.

To consider now the manipulation of the plate in process of printing. The printer, having at hand a supply of paper properly damped, and before him a prepared ink and dabber on the slab, the heating-plate at a temperature somewhat too high for the hand to bear, several pieces of muslin, and a mahogany board upon which the plate is laid while being wiped, and which, in order to insure that the hand in wiping shall work at a proper angle to the plate, should be about forty inches from the ground, or about at the level of the elbow, proceeds as follows:—The plate having been previously cleaned with turpentine, is placed upon the heater, until it becomes as hot as the hand can comfortably bear it, and the ink is applied with the dabber in a thick coat over the whole of the surface. For the first proof it is also necessary to rub the ink well into the heavy lines with the finger, as the dabber sometimes fails to penetrate them.

The plate is then removed from the heater, and the excess of ink roughly wiped from it with coarse muslin, used in straight strokes, much, however, being left both in the lines and also on the surface of the plate to be utilised in the subsequent more delicate wiping which it now undergoes. For the purpose of this secondary wiping the muslin should be so arranged in the hand that it will continue to present to the plate a smooth surface, free from rucks or creases. In order to accomplish this, the printer, having selected the portion of the muslin with which to work, holds it outspread upon his left palm, while he takes the nearest margin of the muslin in

his right hand, and brings it underneath the left. The latter is then withdrawn in order to bring forward the opposite margin, and place it in its turn beneath the right hand. At least three smooth layers of the muslin are thus arranged, behind which the remainder is gathered up, and tucked in round the edges, so as to form a cushion of a size to rest conveniently within the hollow of the hand. The muslin is then warmed on the heater, and applied with a constant swift circular motion, but without much pressure, in wiping the plate—the result being that the ink is left in the lines, but wiped from the surface of the plate in various degrees according to the requirement of the subject. The muslin, charged as it is with ink, never thoroughly cleans the copper, but in the cleanest parts leaves a very thin tint which in strong lights, or where clearness of effect is desired, must be removed by wiping with the hand charged with whiting, or with the finger covered with fine muslin—or, in minute lights, with a pointed pencil of wood. The plan is sometimes adopted of hand-wiping the whole surface of the plate, as is done in the printing of line-engravings, but, except in the case of etchings requiring peculiar brilliancy of treatment, it is not to be recommended. Especially is this the case in printing upon Japanese paper, which, as we have seen, has a general tendency to yield “dry” proofs; and the same observation holds good when printing from a steel or steel-faced copper plate. Steel being much harder than copper, parts with the ink more freely, and there is a corresponding danger of over-wiping, and, unless this is counteracted by especially rich treatment, a bare and staring proof is the result.

It is perhaps needless to add that, as the ink when cold adheres strongly to the plate, the latter, as well as the muslin, should be kept warm in order to insure easy management.

The wiping of the plate being finished, the margin and edges should be cleaned with turpentine.

The plate now undergoes, when necessary, a further process of enrichment in the much reviled, but quite justifiable

and oftentimes indispensable, process of *retroussage*. For this it is again placed on the heater until very hot, and the printer, armed with some of the softest and finest muslin, which should be also heated, and gathered up as for wiping the plate, draws the ink over the edges of the lines on to the surface of the copper by gently dragging the muslin across them. By this means their strength is increased according to their depth and the quantity of ink which they hold, and a soft richness of effect obtained which adds much to the beauty of the proof, resembling the velvety character which, in dry-point, results from leaving the bur upon the plate. *Retroussage* is, in fact, the equivalent in pure etching to the bur in dry-point, and is equally admissible in practice, and it may be observed that the wiping of the plate for the latter involves at least as much skill and "treatment" as for the former.\*

Objections have been raised to the practice not only of *retroussage*, but also of leaving any tint upon the surface of the plate—to all treatment, in short, by which the effect of the plate can be enhanced in printing; and it is urged that all enrichments should be in the plate itself—worked by the etcher's own hand—instead of being left to be supplied by the printer in preparing the plate for the press, and the great name of Rembrandt is adduced as an authority in support of the practice advocated.

A recent writer in the *Pall Mall Gazette* maintains that in Rembrandt's method of printing "all ink except what is lodged in the lines is removed," and "what he intends to appear in the proof, that, and that only, his etching-point traced upon the plate;" and further, that "throughout the darkest of the shadows the magnifying-glass reveals particles of white paper seen through the crossings of the lines." To this it must be answered that enrichment by added lines and

\* Those who object to *retroussage* in printing should, in order to be consistent, condemn in an equal degree the use of the bur, the effect of which is entirely dependent upon the management of the plate in wiping.

enrichment by skilful wiping are two totally distinct matters, differing as much in effect as in execution, neither of which can be taken to supply the place of the other. Of this Rembrandt was well aware, and we have already seen, when discussing the plate of "Christ healing the Sick," that, where he considered such enrichment desirable, he did not hesitate to leave a tint of ink upon the surface of the plate. It is true that throughout a large portion of the deep shadow paper is visible, but in all the deepest passages (if we may judge from the fine impression of the first state of the plate in the Print Room of the British Museum) no amount of magnifying will disclose the least glimpse of it. Moreover, any one acquainted with the *technique* of etching, and who has studied Rembrandt's work in its entirety, must be aware that he frequently resorted both to the bur in dry-point, and to *retroussage* in order to increase the richness of his shadows. It is further objected that enrichment by the printer's treatment is an unsound method, owing to the uncertainty of its results, and that, however charming the effect may be, the practice is wrong in principle, and will be fatal to sound draughtsmanship, because it makes the artist dependent upon the craftsman. But it is difficult to see how this dependence is to be avoided, unless the former is prepared to print his plates himself—an operation for which he is not in all cases endowed with the requisite time and skill. Practically, the distinction between artist and craftsman is in this instance somewhat shadowy. Does an etcher who prints his own plates remain an artist only so long as he has the needle in his hand, and become a craftsman on taking up the printing muslin? The ink is but a pigment, and its distribution over the surface of the plate is in all respects as artistic a process as that of applying a glaze or scumble to an oil painting, and unless a printer is gifted with the seeing eye, and has something of the artistic instinct strong within him, it will be useless for him to attempt to deal with high-class etchings. It is, of course, for the etcher to decide in the first instance

upon the treatment—including, not only the wiping of the plate, but such matters as the choice of paper, and of the colour and consistency of the ink—with all of which the question of wiping is most intimately blended—which best carries out his intention, but, when that is settled, it can as a rule be far more consistently and uniformly followed by the skilled and practised hand of the printer, than it would be by the etcher himself. The certainty and uniformity of the result, again, depend not only on the skill of the printer, but also on the degree to which the effect is left to be supplied. When the plate has been sufficiently worked, and nothing but mere enrichment is required, the result in competent hands is practically certain. When, on the other hand, the work is very open, and has to be supplemented with heavy masses of ink, it is impossible to insure absolute uniformity in the proofs, and it may be necessary freely to weed out from the *tirage* such as may not bear out the artist's intention.

The inconsiderate outcry which has been raised against *retroussage*, and all the kindred methods of enhancing the effect of etchings, appears to be due to a misconception as regards the object of the etcher's art, akin to that which leads some uninstructed people to judge etchings according to canons applicable only to line-engravings. Even in the case of these latter it is a mistake to suppose that the wiping of the plate is the simple and unsophisticated process which the objectors to *retroussage* would have us believe. There is, in fact, in the wiping of a line-engraving much management required to bring out the full quality of the plate, although to the unpractised eye the traces of it are not obvious, and in a proportionate degree the engraver becomes dependent upon the printer. An etching, however, which should embody the direct expression of the artist's thought stands on a different footing, and the only sound principle would be to select that treatment which best conduces to such expression, irrespective of the question whether it does

or does not conform to the requirements of a purism which concerns another branch of art.\*

The expedients in question, when judiciously adopted, are of high value, but they are, like many other good things, liable to abuse, and one may sympathize with the writer in the *Pall Mall Gazette* in his dislike of them when they are abused. His denunciation, however, is much too sweeping and absolute, and the notion that Rembrandt never resorted to them is at variance with the facts of the case.

In order to exhibit the nature and the degree of enrichment which an ordinary amount of *retroussage* imparts to a proof, an impression is added from the plate of "The Larch Wood," so treated. It should be compared with the simply hand-wiped impression from the same plate, forming one of the illustrations to the chapter upon "Methods of Working."

The proofs when printed should be dried separately, and this not only as regards the paper, but the ink also—so that, in the after-process of flat-drying, the lines may retain their relief. When they are thoroughly dry, the paper should be again slightly damped, and each proof, protected by tissue paper, should be placed between thick millboards, and so dried under heavy pressure. This will flatten the paper at the edge of the plate-mark and elsewhere without affecting the lines, and the full character of the heavily bitten work will be preserved.

The number of proofs which a copper plate will yield without deterioration depends much upon the manner of its execution. In dry-point, where the effect of the line is due to the presence of the bur, the limit is soon reached, and in

\* The confusion of thought prevailing upon this subject is curiously illustrated by the use which one of the objectors makes of an anecdote related of Mr. Samuel Cousins. It appears that Mr. Cousins once reprimanded a printer who proposed to force the effect of one of his plates by special treatment. Mr. Cousins is an engraver in mezzotint, and, as it may be presumed that his plates receive their full desired enrichment in the mezzotinting process, it seems natural that he should object to their receiving anything more at the hands of the printer. But why the fact of the mezzotinter obtaining richness in one way should debar the etcher from doing so in another, is not so clear.

the case of very delicate dry-point work not more than three or four proofs—sometimes not more than one—can be taken without serious deterioration being observable. The heavy pressure which the plate undergoes in its passage through the press tends to flatten the bur, and so reduce its power, but a more destructive agent is to be found in the wiping. However thoroughly the ink may be ground, it still retains something of its granular character, and, as the muslin charged with it passes over the surface of the plate, it acts like emery in reducing, and before long entirely removing, the bur. To this kind of deterioration bitten work is less liable than dry-point, but even bitten work suffers when the lines are closely placed. Here the ridge of metal which separates contiguous lines becomes reduced, and the clear crispness originally characteristic of the work gives place to confusion and dulness, which increase with every succeeding proof.

The impossibility of obtaining more than a very small number of satisfactory impressions rendered the process of etching upon copper unsuitable for book illustration, or other similar purpose, and tended to restrict its application to those cases of artistic expression in which a limited issue was held to be no disadvantage. At the present day, thanks to the discovery of a method of electro-plating copper with iron, all this has been changed, and the adoption of high-class etchings for illustration has become very general. The coating of iron, so thin that the most delicate and faintly-worked lines remain for all practical purposes unaltered, affords, to bitten work at least, a protection amply sufficient for all ordinary requirements. After a long course of printing, indeed, the iron begins to wear away, and the copper reappears, but it is easy, by removing the former and applying a fresh film, to reinstate the protection as at first, and some thousands of impressions may thus be taken without any perceptible deterioration occurring to the plate. In the case of dry-point, however, the protection is less complete; for,

although the iron enables the bur to withstand the abrasion of the muslin for a much longer period than would be possible in its unprotected state, still after many proofs have been taken the bur will show signs of wear, and when this takes place, it is obvious that a simple renewal of the iron will fail to replace it. Resort must, in fact, be had to a reworking of the passage.

The tendency of a steel, or rather iron-faced, plate to yield dry impressions has been already pointed out, and the necessity of neutralising it by special treatment in wiping the plate. There is, perhaps, no more crucial test of the skill of a printer than his success in combating this tendency, whether arising from the state of the plate itself, or from the nature of the paper used. In the skilful hands of that accomplished printer, Mr. F. Goulding, it is, as a rule, impossible to detect any difference between proofs taken from the iron-faced plate and those pulled from the "native" copper—both being equal in point of richness. But it is only from such hands that uniformity in this result may be expected, and the treatment involves an extra expenditure of time.

The plate, in its passage between the rollers, parts with the greater portion of the ink with which it is charged; but a certain quantity remains behind in the lines, and this, if allowed to become dry, tends to fill up the latter, and so to reduce their strength for subsequent printing. Hence it is necessary, before laying the plate aside after printing, to remove from it every particle of ink, to effect which a sufficient quantity of turpentine to cover it should be poured over the plate, and allowed to remain until the ink is seen to rise from the lines and become diffused over the surface. The turpentine and ink together may then be removed by rubbing the plate with "mosings"—the soft shreds and scrapings produced from leather during its manipulation under the hand of the currier. Should the ink have been allowed to dry in the lines, it may yet be removed by a strong solution of caustic potash, which should remain on the plate until, the

oil being dissolved, the other constituents of the ink have lost their cohesion.

## XII.—CONCLUSION.

The foregoing chapters have had reference exclusively to etching upon copper—a material which seems to answer best the artist's requirements. Where a large number of impressions are required, however, the superior hardness of steel has recommended it for use, and upon steel such etchings as were required for book illustration have for the most part been executed. Since the discovery of the electroplating process the disparity between steel and copper plates in respect of durability has practically disappeared, while copper presents a distinct advantage over steel in being less liable to rust. Zinc, which also enjoys a similar advantage, is a favourite material with many etchers, and is less costly than copper. It yields proofs of great richness, and will afford a larger number of them than the unprotected copper before showing signs of wear, although not so many as the copper when plated with iron. It is, indeed, possible to coat the zinc with iron, but only in an indirect way, involving the double process of first plating the zinc with copper, and then applying the iron to the latter. This of course increases the expense of the protection, and also tends to fill up the finer lines of the work. Both in the case of steel and zinc the foregoing remarks as to grounding and working the plate hold good. The mordant generally used for steel is dilute sulphuric acid—that for zinc may be the hydrochloric mordant already described, but, as the action of the latter upon zinc is exceedingly rapid, either the period of biting must be proportionately shortened or the mordant much diluted.

Some remarks upon the subject of etching from nature, and the equipment necessary for its convenient pursuit, may not be out of place. Upon the desirability of the practice, and the distinct gain in expressiveness which follows its

adoption, it is, perhaps, unnecessary at this day to insist. In most forms of artistic expression the difference between work executed with constant and direct reference to nature, and that copied from studies, is, to the educated eye, sufficiently manifest, but there is probably none in which this difference more obviously declares itself than in the precise and delicate work of the etching-needle. It often happens, of course, that the *motif* of an etching is such as can be only thoroughly worked out in the studio. Even when such is the case, it will be found that the work will be all the better, all the more full of interest, from the details being wrought direct from nature, while in other cases such a method of practice will be found indispensable. But, from what has been previously said in reference to methods of working, it will be readily understood that, in etching from nature, it will not be sufficient for the needle-work alone to be done upon the spot. When an etcher finds himself face to face with an intricate landscape, or indeed any subject other than the very simplest, he will become aware that, in order to grapple satisfactorily with the complexities of distance, or of shadow, or texture, it is as necessary to bite as it is to draw "from nature," and that oftentimes the processes of needle-work and biting must be carried on *pari passu*. He should, in fact, travel armed with all necessary appliances for needling the plate, biting, and stopping out, although it will be generally found most convenient that the preparation of the plate, including the grounding and varnishing at the back, should be effected at home.

For the purpose of carrying a stock of prepared plates without injury when travelling, a strong wooden box should be provided, deep enough to receive lengthways the longest plate intended to be carried, and furnished at its opposite ends with V-shaped grooves. Into each pair of the grooves a plate (having one of its dimensions of a corresponding uniform length) will slide, so that the box will accommodate any plate, not exceeding in length its internal depth, one

dimension of which will fit the grooves. For smaller plates it will be necessary to have flat panels bevelled at the ends to slide into the grooves, and upon these the plate can be fixed by a few small screws placed close to its edges, so that the plate is clipped by the screw-heads, and thus retained in its place. The box should have its corners bound with hoop iron, and the lid should be furnished with strong hinges and lock.

In addition to the travelling box above described, a light case (Fig. 7) is necessary for carrying the single plate for the time being in process of execution, and it will be found convenient to have this so far corresponding in dimension to the other as to fit similarly sized plates. It should take the form of a shallow box, about a quarter of an inch in depth, the lid consisting of a plain panel furnished on its under side with two fixed longitudinal strips of wood, so placed that, when the box is closed, they fit just within its hollow, and, pressing against the plate, retain the latter in place. The strips should be bevelled so as to touch only the edge of the plate, one dimension of which should exactly correspond with the internal width of the box. At one end of the latter the woodwork should be prolonged for about an inch and a half, and pierced with a hole of about half an inch diameter, to receive the upright stem of a small mirror. And in the bottom of the box, on the outside, a brass plate should be inserted to receive a screw, by which it may be fixed to a tripod stand, and thus form a

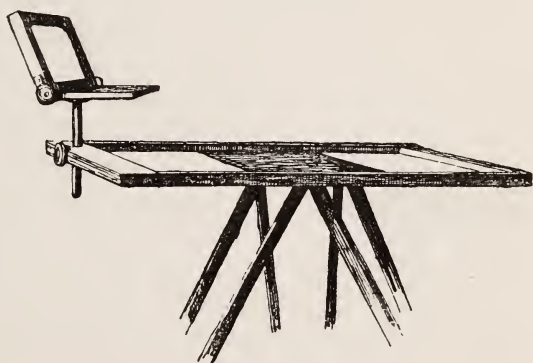


Fig. 7.

table for out-door work. The legs of the stand should be made to slide telescope-fashion, in order that they may be adapted to any inequality of surface in the ground.

The mirror is useful for the purpose of reversing the drawing of any plate which professes to be a portrait, in order that in the proof the scene or object represented may appear as it does in nature. Some etchers disregard this process of reversal, considering that, artistically, the composition is the same, in whichever way it may be viewed. But, although this way of looking at the question may be theoretically sound, still it is the case that the public do not always occupy the standpoint of the artist, but, when a picture is presented to them professing to represent some familiar scene or object, they have a weakness for beholding it in its accustomed guise. This betrays, perhaps, a sad want of the power of abstraction; but so it is, and the etcher should deal with the world as he finds it. It is quite feasible, after a little practice, to effect this reversal by a mental operation, in the act of drawing, and without the intervention of a mirror, and, as the latter is accompanied with its own difficulties and annoyances, the etcher is counselled to practise drawing in reverse, and thus render himself independent of the mirror. He will find the practice much less difficult than he would expect. But, assuming that he should consider the difficulties inherent in the process of etching to be sufficient for his encountering, and prefer such ease as the mirror is calculated to afford, the following suggestions may be found useful. The mirror (Fig. 7) should not be too large or heavy to be held conveniently in the hand, and it should be attached by a hinge to a strong wooden lid, which will serve both as a protection to the glass when closed and a base for its proper adjustment during work, and the hinge should be furnished with a screw, by the tightening of which the mirror may be retained at any desired angle. The outside of the lid should be furnished with a brass plate forming a screw

socket into which is fixed the end of a brass stem, to be either held in the hand, or fastened, by a small side screw, in the before-mentioned hole at the end of the box or table. In working on a large plate it will be found most convenient to hold the mirror in the hand. The mirror, if made of ordinary looking-glass, is apt to give a double reflection, which in bright weather and at certain angles is most distracting in its effect. But this is, perhaps, a less evil than is experienced when the mirror is made of black, or blackened glass. In this case so much of the light is absorbed that, in dark weather, the details of all shadowed objects are entirely lost to the eye.

The appliances for biting should include a large 80-oz. stoppered bottle for the prepared mordant, and a smaller bottle of hydrochloric acid for the manufacture of fresh mordant when requisite, together with a supply of chlorate of potash. Also, for partial biting, a small bottle of strong nitric acid solution, and the above-described glass tube, with its india-rubber bulb for the application of it. All these, together with a small thermometer, a glass pipette, and tube of india-rubber, the object of which will presently appear, can be packed in a wicker case, which should be divided into partitions and padded.

The bath for the mordant is usually of porcelain. But porcelain is a somewhat fragile material, and, if large plates are used, will be found unnecessarily cumbrous to carry. In this case, the writer would recommend the substitution of a light, shallow wooden box or tray, about two inches in depth, over which, when required to be used as a bath, a stout sheet of india-rubber may be placed. The only difficulty attending its use occurs in emptying it, and this is readily overcome by means of a piece of india-rubber tubing used as a syphon. The bath being slightly tilted, one end of the tube, previously notched to allow the free passage of the liquid when pressed against the bottom of the bath, should be placed in the mordant at its deepest point. In the other end of the tube a

glass pipette (Fig. 8) should be inserted, and, the mouth of the operator being applied to the latter, the mordant should be drawn into the tube by suction. In order to prevent the liquid reaching the mouth, the pipette should be furnished, at about its centre, with a bulb, into which the liquid would



Fig. 8.

be seen to rise long before entering the upper part of the pipette. As soon as the tube is charged with the mordant, the pipette is withdrawn, and the free end of the tube placed within the mouth of the bottle, into which the whole contents of the bath will speedily flow.

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